GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF GENERAL SERVICES

ATTACHMENT J.1 A

[ATTACHMENT WILL APPEAR ON THE FOLLOWING PAGE]

SECTION 00 0101

PROJECT TITLE PAGE - ENGINE 4, 5, 8, 20 & 24

PROJECT MANUAL

FOR

DGS - FEMS - ENGINE 4, 5, 8, 20 & 24 - ROOF REFURBISHMENT

OWNER'S PROJECT NUMBER: 4688

THE DEPARTMENT OF GENERAL SERVICES

DATE: DECEMBER 5, 2021

PREPARED BY:

BLUEFIN LLC, A DIVISION OF MANTIS INNOVATION

END OF SECTION 00 0101

SECTION 00 0102
PROJECT INFORMATION - ENGINE 4, 5, 8, 20 & 24

PART 1 GENERAL

1.01 PROJECT IDENTIFICATION

A. Project Name: DGS - FEMS - Engine 4, 5, 8, 20 & 24 - Roof Refurbishment

B. Owner's Project Number: 4688

Engine 4 - Project Location:

2531 Sherman Ave. NW

Washington, District of Columbia 20001

Engine 5 - Project Location:

3412 Dent Place NW

Washington, District of Columbia 20007

Engine 8 - Project Location:

1520 C St. SE, Washington, D.C. 20003

Washington, District of Columbia 20003

Engine 20 - Project Location:

4300 Wisconsin Ave, NW

Washington, District of Columbia 20037

Engine 24 - Project Location:

5101 Georgia Ave NW

Washington, District of Columbia 20011

C. The Owner, hereinafter referred to as Owner: The Department of General Services

D. Owner's Project Manager: Designer

E. Owner's Project Manager: BLUEFIN LLC, a division of Mantis Innovation

Address:	2134 Espey Ct., Ste. 14, Crofton, MD 21114
Project Manager:	Ahmad Tabana
Direct:	443-584-4014
Mobile:	201-696-5607
E-mail:	atabana@mantisinnovation.com

1.02 NOTICE TO PROSPECTIVE DESIGN-BUILDERS

A. These documents constitute a Notice of Intent to Request Proposals and a Request for Qualifications from prospective contractors for the construction of the project described below.

1.03 PROJECT DESCRIPTION

A. The city of Washington D.C. hereby adopts and elects to enforce the provisions of the work to be performed in conformance with the latest adopted 2017 District of Columbia Building Code and Energy Conservation Code, 2015 International Existing Building Code (IEBC), 2015 International Mechanical Code (IMC), 2015 International plumbing codes (IPC), local governing building codes, local ordinances and all referenced standards. These documents serve to depict the final configuration of improvements, not dictate all responsibilities the contractors have in achieving that end. The contractor is to report to the designer any conflict between bid documents, field conditions and/or code requirements prior to commencement of work. All products proposed for use shall be in accordance with applicable federal, state and local governing ordinances, codes and regulations. Notify the consultant immediately of conflicts between the specified products and/or project work requirements and codes, ordinances and/or regulations.

B. **Engine 4: The Scope of Work for this project** includes a Capital Roof Replacement for Roof Areas A, B, C, and D with demolition of the existing sprayed in place polyurethane roof system and the 3 ply built-up roof system down to the existing concrete roof deck and properly dispose of the same in accordance with local codes and ordinances. The new roof system shall be installed to meet or exceed all local and national codes for a UL Class A and FM I-90 application. The new roof system shall consist of a 30 mil SBS vapor retarder, a base layer of 2" CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), second layer of Tapered CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), a new ½" CGF HD coverboard ASTM C 1289 Type II Class 4 Grade 2(100 +psi) (R-total =33.00) and an adhered 60 mil TPO / PVC roof membrane. Additional work includes adding 2x wood nailers to roof edge and roof curbs to accommodate new roof insulation thickness to achieve manufacturers' minimum flashing height of 8" from the finished roof surface. Also included is installing a new roof hatch, raising the existing BAC unit to accommodate new rail curb flashing, and new pre-manufactured perimeter trim metal to be incorporated into the roof system warranty. All new roofing is to be installed for the special project warranty requirements to meet or exceed the manufacturers 20-year total system NDL warranty.

C. **Engine 5: The Scope of Work for this project** includes a Capital Roof Replacement for Roof Areas A and B with demolition of the existing roof system down to the existing wood plank roof deck and properly dispose of the same in accordance with local codes and ordinances. The new roof system shall be installed to meet or exceed all local and national codes for a UL Class A and FM I-90 application. The new roof system shall consist of a mechanically attached ½" base glass faced gypsum firebarrier board, a 30 mil SBS vapor retarder, a base layer of CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), second layer of CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), and a new ½" CGF HD coverboard ASTM C 1289 Type II Class 4 Grade 2(100 +psi). All construction layers to achieve an R-total =33.00. The new roof covering is to be an adhered 60 mil TPO / PVC roof membrane. Additional work includes adding 2x wood nailers to roof edge and roof curbs to accommodate new roof insulation thickness to achieve manufacturers' minimum flashing height of 8" from the finished roof surface , new access door, masonry re-pointing and a wall penetration waterproofing application. Also included is installing new pre-manufactured perimeter trim metal, gutter and downspouts to be incorporated into the roof system warranty. All new roofing is to be installed for the special project warranty requirements to meet or exceed the manufacturers 20-year total system NDL warranty

D. **Engine 8: The Scope of Work for this project** includes a Capital Roof Recover for Roof Area A. The existing roof system at Roof Area A consists of an aggregate surfaced coal tar built-up roof system. Loose gravel will be removed with hydrovac to provide a clean, dust free, dry surface. The roof will be prepared as required by the manufacturer including cutting out all blisters, sealing and priming if required. 2" CGF polyisocyanurate insulation will be adhered to the prepared roof system as required to meet specified uplift pressures. Install a new 60 mil TPO adhered roof system and associated edge metals. Include a minimum of a 10-year manufacturers NDL warranty.

A. **Engine 20: The Scope of Work for this project** includes roof coating system at Area D with a new urethane traffic coating with a minimum 10-year NDL warranty. Work also includes refurbishment of cap and pan clay tile at Area B and standing seam metal roofing at Area C as well as refurbishment of gutters and downspouts at Areas B and C with contractor's maximum installation and repair warranty. Roof Area A is not included in the scope of work.

The following are the Refurbishment scope of work quantities:

1. Defects: Section B - Refurbish broken and/or missing tiles, properly resecure/install new tile to match existing with copper wire or repair clips with copper nails. Quantity: 40 EA.
2. Defects: Section C – Restore the transverse seam sealant at (6) dormer locations as defined on the contract drawings, approx. 300 lin. Ft.

3. Water test all gutters prior to construction. Plug downspout outlets, Fill gutters with 2" of water, and allow to set for 4 hours. Note any leakage – repair adjacent seams to where the leak is observed. Approx 12 locations

E. **Engine 24: The Scope of Work for this project** includes Capital Roof Replacement for Roof Areas A, C, D, and F consists of the following: remove existing built up roofing, aggregate, and insulation down to the existing precast concrete deck. Refurbish concrete deck as needed on a unit rate basis, document with quantities and photographs. Furnish and install a new 80 mil PVC membrane fully adhered over ½" ASTM C 1289 Type II Class 4 Grade 2 (100+ psi) CGF Polyisocyanurate (ISO) HD coverboard and ASTM C 1289 Type II, Class 2 Grade 2 (20 psi) or Grade 3 (25 psi) ISO insulation (R-33 total system) with first layer fully adhered to the precast concrete roof deck and all other layers fully adhered above. Additional work includes raising existing equipment (verify quantity in field), equipment line support blocks (verify quantity in field), gas/conduit service piping (verify quantity in field), installing walk pads from roof access locations and rooftop equipment access doors, and replacing surface-mounted flashings. Replace metal coping at transition between parapet wall and tile roof at Area A. Existing stone copings will not be replaced. Existing roof drains may be salvaged and reused, replace as necessary to restore performance. Provide tapered insulation to sump to drains and provide crickets around curbed equipment to promote positive drainage. Replace plastic drain strainers with cast iron strainers (verify quantity in field). Provide new splash pans for downspouts discharging onto low slope roof areas (verify quantity in field). Provide minimum 25-year NDL manufacturer's warranty..

Work also includes capital roof refurbishment of clay tile as well as repair of gutters and downspouts at Areas B and E with contractor's maximum 5-year installation and repair warranty.

1. Defect 1: Sections A, F - Clean out heavily clogged roof drains. Quantity - 2 each.
2. Defect 2: Sections B, E - Replace damaged/broken/missing clay tiles. Quantity - Approximately 25 EA.
3. Defect 3 – Sections B, E - Water test all gutters prior to construction. Plug downspout outlets, fill gutters with 2" of water, and allow to set for 4 hours. Note any leakage – refurbish open seam and adjacent seams (clean seams and apply geocel 2300 sealant) where the leak is observed. – Approx 20 locations.

Roof Area A – Alternate 2: remove the existing asphalt coated duct covering and replace with new Alumagard all-weather cladding by Polygard, www.polygardproducts.com, or equal – approx. 3600 sq ft

F. Coordinate all work with owner's rep and facility manager.

G. The building will be occupied and in use during construction.

H. The Contractor shall observe all applicable state and federal OSHA requirements.

I. Contractor to be properly licensed and an approved applicator for the manufacturers specified in the project documents, and must be able to provide a fully completed project including all required details, expressed or implied, to support the project's special warranty requirements.

J. It shall be the responsibility of the contractor to locate all existing utilities whether shown herein or not, and to protect utilities from damage. The contractor shall bear all expenses of repair or replacement of utilities or other property damaged by operations in conjunction with the execution of the work

K. Contract Terms: Lump sum (fixed price, stipulated sum), with incentives.

1.04 PROJECT CONSULTANTS

A. Owner's RFP and Design Consultant: BLUEFIN LLC, a division of Mantis Innovation
   Address: 2134 Espey Ct.
   City, State, Zip: Crofton, MD 21114.
   Phone/Fax: (201) 696-5607
   Project Manager: Ahmad Tabana

E-mail: atabana@mantisinnovation.com

1.05 PROCUREMENT TIMETABLE

A. RFQ Documents Available: TBD.

B. Last Request for Information Due: TBD days prior to due date of qualifications statements.

C. Pre-Bid Site Tour: TBD at TBD.

D. Anticipated Proposal Due Date: TBD, before 4 PM local time.

E. Pre-Award Interviews: TBD.

F. Notice of Award: Within 7 days after due date.

G. Proposals May Not Be Withdrawn Until: 30 days after due date.

H. Contract Award: 45 calendar days.

I. Contract Duration: To be stated in bid documents.

J. Desired Construction Start: Not later than TBD.

K. The Owner reserves the right to change the schedule or terminate the entire procurement process at any time.

1.06 PROCUREMENT DOCUMENTS

A. Availability of Documents: Complete sets of procurement documents, including Owner / Contractor Contract may be obtained:
   1. From Owner at the Designers' address listed above.
   2. Request at the following address: atabana@mantisinnovation.com.

1.07 SIGNATURE

Company:_____

Address:_____

City:_____

State:_____

Zip:_____

By:_____

Signed: _____

a. (Authorized signing officer)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 0102 00 0102

SECTION 00 0110
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N1.0	**GENERAL NOTES**
R1.0	**DEMOLITION ROOF PLAN**
R1.1	**PROPOSED ROOF PLAN**
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R2.1	**ROOF DETAILS**
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SECTION 00 0115
LIST OF DRAWING SHEETS - ENGINE 4

C1.0 COVER SHEET & INDEX - ENGINE 4
N1.0 GENERAL NOTES
R1.0 DEMOLITION ROOF PLAN
R1.1 PROPOSED ROOF PLAN
R2.0 ROOF DETAILS
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END OF SECTION 00 0115

SECTION 00 0115
LIST OF DRAWING SHEETS - ENGINE 5

C1.0 COVER SHEET & INDEX - ENGINE 5
N1.0 GENERAL NOTES
R1.0 DEMOLITION ROOF PLAN
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SECTION 00 0115
LIST OF DRAWING SHEETS - ENGINE 20

C1.0 COVER SHEET & INDEX - ENGINE 20
N1.0 GENERAL NOTES
R1.0 DEMOLITION ROOF PLAN
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R2.0 COATING DETAILS
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END OF SECTION 00 0115

SECTION 00 0115
LIST OF DRAWING SHEETS - ENGINE 24

C1.0	**COVER SHEET & INDEX - ENGINE 24**
N1.0	**GENERAL NOTES**
R1.0	**DEMOLITION ROOF PLAN**
R1.1	**PROPOSED ROOF PLAN**
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END OF SECTION 00 0115

SECTION 01 1001
SUMMARY OF WORK - ENGINE 4, 5, 8, 20 & 24

PART 1: GENERAL

1.01 REFERENCED SECTIONS

A. Section 01 1001 - Project Information

1.02 SITE IDENTIFICATION

DGS - FEMS - Engine 4, 5, 8, 20 & 24 - Roof Refurbishment

Washington, District of Columbia 20003

1.03 SCOPE OF WORK:

A. The information given herein and on the plans is as exact as could be secured for bidding purposes. Accuracy is to be field verified. Contractors must examine the job conditions and verify all measurements, distances, elevations, clearances, etc. And base their bids and work on verified conditions.

B. Refer to project specifications for additional information.

C. The city of Washington D.C. hereby adopts and elects to enforce the provisions of the work to be performed in conformance with the latest adopted 2017 District of Columbia Building Code and Energy Conservation Code, 2015 International Existing Building Code (IEBC), 2015 International Mechanical Code (IMC), 2015 International plumbing codes (IPC), local governing building codes, local ordinances and all referenced standards. These documents serve to depict the final configuration of improvements, not dictate all responsibilities the contractors have in achieving that end. The contractor is to report to the designer any conflict between bid documents, field conditions and/or code requirements prior to commencement of work. All products proposed for use shall be in accordance with applicable federal, state and local governing ordinances, codes and regulations. Notify the consultant immediately of conflicts between the specified products and/or project work requirements and codes, ordinances and/or regulations.

D. **Engine 4: The Scope of Work for this project** includes a roof replacement with a new UL Class A, 60 mil TPO / PVC insulated roof system on all low sloped roof areas, A, B C and D to achieve a minimum 20 -year NDL warranty.

E. **Engine 4: The Scope of Work for this project** includes a Capital Roof Replacement for Roof Areas A, B, C, and D with demolition of the existing sprayed in place polyurethane roof system and the 3-ply built-up roof system down to the existing concrete roof deck and properly dispose of the same in accordance with local codes and ordinances. The new roof system shall be installed to meet or exceed all local and national codes for a UL Class A and FM I-90 application. The new roof system shall consist of a 30 mil SBS vapor retarder, a base layer of 2” CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), second layer of Tapered CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), a new ½” CGF HD coverboard ASTM C 1289 Type II Class 4 Grade 2(100 +psi) (R-total =33.00) and an adhered 60 mil TPO / PVC roof membrane. Additional work includes adding 2x wood nailers to roof edge and roof curbs to accommodate new roof insulation thickness to achieve manufacturers’ minimum flashing height of 8” from the finished roof surface, installation of a new roof hatch, raising the existing BAC unit to accommodate new rail curb flashing, new pre-manufactured perimeter trim metal to be incorporated into the roof system warranty, and installation of (1) one Portal Plus unit on each level of the roof (locations to be determined by owner) flashed per detail 12/R2.0. The existing BAC unit will require a temporary disconnect to raise the unit to accommodate the new roof flashing, please use Henry Hottle (besarey@harveyhottel.com, Mobile: 240-687-8346). All new roofing is to be installed for the special project warranty requirements to meet or exceed the manufacturers 20-year total system NDL warranty.

F. **Engine 5: The Scope of Work for this project** includes a roof replacement with a new UL Class A, 60 mil TPO / PVC insulated roof system on all low sloped roof areas, A, and B to achieve a minimum 20 -year NDL warranty.

G. **Engine 5: The Scope of Work for this project** includes a Capital Roof Replacement for Roof Areas A and B with demolition of the existing roof system down to the existing wood plank roof deck and properly dispose of the same in accordance with local codes and ordinances. The new roof system shall be installed to meet or exceed all local and national codes for a UL Class A and FM I-90 application. The new roof system shall consist of a mechanically attached ½" base glass faced gypsum firebarrier board, a 30 mil SBS vapor retarder, a base layer of CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), second layer of CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), and a new ½" CGF HD coverboard ASTM C 1289 Type II Class 4 Grade 2(100 +psi). All construction layers to achieve an R-total =33.00. The new roof covering is to be an adhered 60 mil TPO / PVC roof membrane. The existing rising wall may have existing siding hidden behind the sprayed in place foam covering - contractors are required to remove and install new plywood as designed. Additional work includes adding 2x wood nailers to roof edge and roof curbs to accommodate new roof insulation thickness to achieve manufacturers' minimum flashing height of 8" from the finished roof surface, new access door, masonry re-pointing and a wall penetration waterproofing application, and installation of (1) one Portal Plus unit on each level of the roof (locations to be determined by owner) flashed per detail 5/R2.1. Also included is installing new pre-manufactured perimeter trim metal, gutter and downspouts to be incorporated into the roof system warranty. All new roofing is to be installed for the special project warranty requirements to meet or exceed the manufacturers 20-year total system NDL warranty

H. **Engine 8: The Scope of Work for this project** includes specified recover of the existing roof system on Roof Area A; Furnish and install a new 60 mil, TPO membrane roof recover system. The new recover roof system will provide a 10-year NDL warranty.

I. **Engine 8: The Scope of Work for this project** includes a Capital Roof Recover for Roof Area A. The existing roof system at Roof Area A consists of an aggregate surfaced coal tar built-up roof system. Loose gravel will be removed with hydrovac to provide a clean, dust free, dry surface. The roof will be prepared as required by the manufacturer including cutting out all blisters, sealing and priming if required. 2" CGF polyisocyanurate insulation will be adhered to the prepared roof system as required to meet specified uplift pressures. Install a new 60 mil TPO adhered roof system and associated edge metals. Additional work includes adding 2x wood nailers to roof edge and roof curbs to accommodate new roof insulation thickness to achieve manufacturers' minimum flashing height of 8" from the finished roof surface, raising the existing RTU's to accommodate new roof installation, a new exterior ladder with locking cage as noted on drawings, addition of new ½:12 sloped crickets between drains for positive drainage, new low profile Miro supports at gas lines, and installation of (1) one Portal Plus unit on each level of the roof (locations to be determined by owner) flashed per detail 5/R2.0. Include a minimum of a 10-year manufacturers NDL warranty.

J. **Engine 20: The Scope of Work for this project** includes roof coating system at Area D with a new urethane traffic coating with a minimum 10-year NDL warranty. Work also includes refurbishment of cap and pan clay tile at Area B and standing seam metal roofing at Area C as well as refurbishment of gutters and downspouts at Areas B and C with contractor's maximum installation and repair warranty. Roof Area A is not included in the scope of work.

Engine 20: The Base Bid Roof Coating System for Roof Area D consists of the following: Refurbish existing concrete deck as needed on a unit rate basis, document with quantities and photographs. Furnish and install a new urethane traffic coating system to the prepared deck. Additional work includes replacing surface-mounted flashings and installation of the coating at the threshold. Existing roof drains may be salvaged and reused. Replace plastic drain strainers with cast iron strainers (verify quantity in field). Provide minimum 10-year NDL manufacturer's warranty.

K. **<u>Engine 20:</u> The Scope of Work for this project** includes TPO / PVC over ½" coverboard recover at Area A including stainless steel slip flashing over the terminations at the terracotta parapet caps and at the metal panel on the rising wall, the repair of all gutter joints on Area C directly above Area A / new downspouts, replacement of all lower band boards around (2) two penthouses on Area A / re-seal all cladding joints and applying new paint to the structure cladding, and installation of (1) one Portal Plus unit on each level of the roof (locations to be determined by owner) flashed per detail 3/R2.0. All new roofing is to be installed for the special project warranty requirements to meet or exceed the manufacturers 20-year total system NDL warranty. Roof coating system at Area D with a new urethane traffic coating with a minimum 10-year NDL warranty. All roof top units on Area D must be disconnected to accommodate new traffic bearing reinforced liquid membrane roof system 20' x 20'. Provide ALTERNATE for new TPO / PVC over ½" coverboard recover in lieu of coating at Area D. Work also includes refurbishment of the terracotta cap and book (type) clay tile at Area B and standing seam metal roofing at Area C as well as refurbishment of gutters and downspouts at Areas B and C with contractor's maximum installation and repair warranty.

The following are the Refurbishment scope of work quantities:

1. Upgrades: Section B - Refurbish broken and/or missing tiles, properly resecure/install new tile to match existing with copper wire or repair clips with copper nails. Quantity: 40 EA.
2. Upgrades: Section C – Restore the transverse seam sealant at (6) dormer locations as defined on the contract drawings, approx. 300 lin. Ft.
3. Water test all gutters prior to construction. Plug downspout outlets, Fill gutters with 2" of water, and allow to set for 4 hours. Note any leakage – repair adjacent seams to where the leak is observed. Approx 12 locations

Included in this project are the following refurbishment measures:

DEFECT #	DEFECT DESCRIPTION	QTY
1	Section B - Refurbish broken and/or missing tiles, properly resecure/install new tile to match existing with copper wire or repair clips with copper nails.	40 EA/24 SF
2	Section C – Restore the transverse seam sealant at (6) dormer locations as defined on the contract drawings	300 lin. Ft.
3	Section B&C - Water test all gutters prior to construction. Plug downspout outlets, Fill gutters with 2" of water, and allow to set for 4 hours. Note any leakage – repair adjacent seams to where the leak is observed.	12 locations

L. **<u>Engine 24:</u> The Scope of Work for this project** includes Capital Roof Replacement for Roof Areas A, C, D, and F consists of the following: remove existing built-up roofing, aggregate, and insulation down to the existing precast concrete deck. Refurbish concrete deck as needed on a unit rate basis, document with quantities and photographs. Furnish and install a new 80 mil PVC membrane fully adhered over ½" ASTM C 1289 Type II Class 4 Grade 2 (100+ psi) CGF Polyisocyanurate (ISO) HD coverboard and ASTM C 1289 Type II, Class 2 Grade 2 (20 psi) or

Grade 3 (25 psi) ISO insulation (R-33 total system) with first layer fully adhered to the precast concrete roof deck and all other layers fully adhered above. Additional work includes raising existing equipment (verify quantity in field), equipment line support blocks (verify quantity in field), gas/conduit service piping (verify quantity in field), installation of (1) one Portal Plus unit on each level of the roof (locations to be determined by owner) flashed per detail 11/R2.0, installation of new interior stairs to access the roof per drawings, installing walk pads from roof access locations and rooftop equipment access doors, and replacing surface-mounted flashings. Replace metal coping at transition between parapet wall and tile roof at Area A. Existing stone copings will not be replaced. Existing roof drains may be salvaged and reused, replace as necessary to restore performance. Provide tapered insulation to sump to drains and provide crickets around curbed equipment to promote positive drainage. Replace plastic drain strainers with cast iron strainers (verify quantity in field). Provide new splash pans for downspouts discharging onto low slope roof areas (verify quantity in field). Provide minimum 25-year NDL manufacturer's warranty.

Work also includes capital roof refurbishment of clay tile as well as repair of gutters and downspouts at Areas B and E with contractor's maximum 5-year installation and repair warranty.

1. Upgrade 1: Sections A, F - Clean out heavily clogged roof drains. Quantity - 2 each.
2. Upgrade 2: Sections B, E - Replace damaged/broken/missing clay tiles. Quantity - Approximately 25 EA.
3. Upgrade 3 – Sections B, E - Water test all gutters prior to construction. Plug downspout outlets, fill gutters with 2" of water, and allow to set for 4 hours. Note any leakage – refurbish open seam and adjacent seams (clean seams and apply geocel 2300 sealant) where the leak is observed. – Approx 20 locations.

Roof Area A – Remove the existing asphalt coated duct covering and replace with new Alumagard all-weather cladding by Polygard, www.polygardproducts.com, or equal – approx. 3600 sq ft

Engine 24: The Scope of Work for this project includes Capital Roof Replacement for Roof Areas A, C, D, and F consists of the following: remove existing built-up roofing, aggregate, and insulation down to the existing precast concrete deck. Refurbish concrete deck as needed on a unit rate basis, document with quantities and photographs. Furnish and install a new 80 mil PVC membrane fully adhered over ½" ASTM C 1289 Type II Class 4 Grade 2 (100+ psi) CGF Polyisocyanurate (ISO) HD coverboard and ASTM C 1289 Type II, Class 2 Grade 2 (20 psi) or Grade 3 (25 psi) ISO insulation (R-33 total system) with first layer fully adhered to the precast concrete roof deck and all other layers fully adhered above. Additional work includes raising existing equipment (verify quantity in field), equipment line support blocks (verify quantity in field), gas/conduit service piping (verify quantity in field), installation of (1) one Portal Plus unit on each level of the roof (locations to be determined by owner) flashed per detail 11/R2.0, installation of new interior stairs to access the roof per drawings, installing walk pads from roof access locations and rooftop equipment access doors, and replacing surface-mounted flashings. Replace metal coping at transition between parapet wall and tile roof at Area A. Existing stone copings will not be replaced. Existing roof drains may be salvaged and reused, replace as necessary to restore performance. Provide tapered insulation to sump to drains and provide crickets around curbed equipment to promote positive drainage. Replace plastic drain strainers with cast iron strainers (verify quantity in field). Provide new splash pans for downspouts discharging onto low slope roof areas (verify quantity in field). Provide minimum 25-year NDL manufacturer's warranty.

Work also includes capital roof refurbishment of clay tile as well as repair of gutters and downspouts at Areas B and E with contractor's maximum 5-year installation and repair warranty.

1. Upgrade 1: Sections A, F - Clean out heavily clogged roof drains. Quantity - 2 each.
2. Upgrade 2: Sections B, E - Replace damaged/broken/missing clay tiles. Quantity - Approximately 25 EA.

3. Upgrade 3 – Sections B, E - Water test all gutters prior to construction. Plug downspout outlets, fill gutters with 2” of water, and allow to set for 4 hours. Note any leakage – refurbish open seam and adjacent seams (clean seams and apply geocel 2300 sealant) where the leak is observed. – Approx 20 locations.

Included in this project are the following restoration measures:

DEFECT #	DEFECT DESCRIPTION	QTY
1	Sections A, F - Clean out heavily clogged drains.	2 EA
2	Sections B, E - Replaced damaged/broken/missing clay tiles.	Approx. 25
3	Section B, E - Water test all gutters prior to construction. Plug downspout outlets, fill gutters with 2” of water, and allow to set for 4 hours. Note any leakage – refurbish open seam and adjacent seams (clean seams and apply geocel 2300 sealant) where the leak is observed.	Approx. 20 locations
4	Add Interior steps to the roof access door	

Roof Area A – Alternate 2: remove the existing asphalt coated duct covering and replace with new Alumagard all-weather cladding by Polygard, www.polygardproducts.com, or equal – approx. 3600 sq ft

PART 2 GENERAL

2.01 CONTRACT DESCRIPTION

A. Contract Type; A single Prime Contract based on a Stipulated Price as provided by successful contractor

2.02 OWNER OCCUPANCY

A. DGS intends to continue to occupy adjacent portions of the existing building during the entire construction period.

B. Cooperate with site manager to minimize conflict and to facilitate continuous operations.

C. Schedule the Work to accommodate facility personnel and patrons.

2.03 CONTRACTOR USE OF SITE AND PREMISES

A. Provide approved structurally sound protection of access to and from facility as required by law:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

B. Time Restrictions:
   1. Limit heavy construction of especially noisy exterior work to hours before 8:00 AM.
   2. Limit lifting of materials and equipment to the roof to weekends limited to the hours of work approved by local ordinances.
   3. Limit conduct of exterior work to local ordinance requirements.

4. Interior work must be completed during off hours.

C. Utility Outages and Shutdown:
   1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days' notice to DGS and authorities having jurisdiction.
   2. Prevent accidental disruption of utility services to other facilities.

2.04 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner and Roof Consultant.

B. It is the intent of the Owner to have portions of the existing roof assembly removed and replaced in a completed, watertight condition on a daily basis.

C. Proper coordination of all aspects of the work by the Contractor and any sub-trades is critical to ensure proper installation and performance of the work. The Contractor's Construction Schedule shall clearly outline the coordination between job tasks of all involved disciplines. Subject to review and acceptance by the Owner, this Schedule will be strictly adhered to by the Contractor and sub-trades.

D. The Contractor's Construction Schedule shall clearly identify the on-site crew foreman and the size of the crew to be utilized. The crew size shall remain consistent and work shall be continuous throughout the project, from start-up to completion.

E. The Owner shall review the Contractor's Construction Schedule prior to the start of any work. After defining the location(s) of the work progress, the Owner shall arrange to control occupancy in the building to the greatest extent possible. It shall be the responsibility of the Contractor to supply the Owner with written notice, 72 hours in advance, if his work location(s) for a workday is different from the schedule. The Contractor shall update his Construction Schedule weekly and submit a copy to the Owner for review.

F. The Contractor shall schedule periodic site visits by the Membrane Manufacturer providing the warranty during the construction period. Announce the Manufacturer's site visit (inspection) to the Owner 72 hours prior to its occurrence. Visits by the Manufacturer's Representative shall be made prior to project start-up, one week into the start of construction, with inspections prior to the installation of the membrane surfacing, at project completion, and as requested by the Owner. The Contractor shall provide the Owner a copy of the Manufacturer's written report for each inspection, indicating Manufacturer's comments pertaining to installation of materials and any corrective recommendations. In addition, the Contractor is responsible to notify and obtain acceptance from the Membrane Manufacturer on detail changes that may affect the roof system warranty.

2.05 DIMENSIONS AND QUANTITIES

A. Verify dimensions and quantities in the field prior to bid submission. The Project Plans and Drawings have been compiled from various sources and may not reflect the actual field conditions at the time of construction.

B. The Contractor is solely responsible for means and methods of construction. Make necessary investigations to become familiar with the project conditions.

C. Additional compensation due to unfamiliarity with project conditions will not be considered.

D. In case of inconsistency between Drawings and Specifications or within either document, the better quality and/or greater quantity of work shall be provided, as determined by the Owner.

2.06 PRE-JOB DAMAGE SURVEY OF FACILITY

A. Perform a thorough pre-job survey of property and all affected and adjacent areas of the building with Owner prior to starting the work in order to document existing damage. Contractor shall document the survey on video tape and provide a copy to the Owner prior to commencing work. Damaged items identified during the survey will not be the responsibility of Contractor unless further damaged by Contractor during execution of project.

2.07 CORRECTION OF DAMAGE TO PROPERTY

A. Consider any damage to building or property not identified in the pre-job damage survey as having resulted from execution of this Contract and correct at no additional expense to Owner.

B. The Contractor will include in the Base Bid the cost to perform any roof related repair that is due to Contractor’s faulty workmanship and/or materials.

C. Repair immediately any damages to facility or site that present a safety hazard or danger to the public.

2.08 GENERAL CONDITIONS:

A. All installed roofing shall be installed to meet current wind pressure values as determined by ASCE-7 -16. A manufacturers letter shall accompany the contractors bid confirming the review of the project plans and specifications in advance of the bid. The manufacturers letter must confirm acceptance of the current design and provide verification that the they have provided the bidder with the correct attachment methods to meet or exceed the current wind loading and uplift requirements for the site.

B. Contractor must be able to supply an FM RoofNav assembly number for the roof system prior to award or submit manufacturers' letter on letterhead that verifies that the subject bid complies with the FM, UL and ASCE 7-16 requirements outlined in the specifications. In cases where wood decks are encountered please refer to manufacturer tested assemblies as found in FBC, Miami DADE, UL or other 3rd party tests conducted by the manufacturer and submit that report number and agency.

C. All installed roofing is to meet or exceed the current IBC codes including all FM and UL requirements for Class A exterior fire ratings as adopted by the local jurisdiction.

D. Reference architectural symbols and abbreviations, see legend.

E. It shall be the responsibility of the contractor to locate all existing utilities whether shown herein or not, and to protect utilities from damage. The contractor shall bear all expenses of repair or replacement of utilities or other property damaged by operations in conjunction with the execution of the work

F. It is the responsibility of the contractor to protect building occupants and passers-by from falling debris or equipment. Do not throw materials from the roof.

G. Contractor is responsible for verifying all dimensions and conditions of the project, including verification of existing roof system construction and materials.

H. Contractor staging and storage areas shall be as directed by the owner's representative at the pre-construction meeting. Contractor shall assume a reasonable amount of storage and staging space will be made available.

I. Contractor is responsible for knowing the roof deck loading capacity of the existing building for storage of materials on the existing structure.

J. Contractor shall be responsible for protecting building surfaces, finishes, and systems from damage, discoloration, etc. during the course of all construction activities.

K. Personal fall protection devices are not, nor will be, provided by the owner on any roof area designated to receive work. Personal fall protection is the responsibility of the contractor.

L. Existing materials and construction are noted on the drawings as existing. All other notations indicate new materials, products, and construction unless otherwise stated or indicated.

M. The base roof design system will provide a 20 year manufacturer’s warranty with an ERSL of 30 years. The new roof system will incorporate low-no-odor adhesives in the application in accordance with current OSHA regulations.

N. The new roof system is to incorporate insulation attachment to incorporate wind pressure enhancements at the perimeter, corners and mid roof sections in accordance with ASCE 7-16 as defined by local codes. Premanufactured tapered insulation units are to be used at roof sumps, crickets and saddles to promote positive water flow to the roof drains and scuppers.

Field fabricated tapered units may be used if approved during the submittal process. This system will be installed in accordance with the manufacturers specifications and seam detailing required for a 30-year application with a 20 year NDL warranty with a 10 year material extension.

O. Tapered insulation layout plan: the contractor is responsible for providing a tapered insulation system layout that eliminates ponding, and moves water to roof drains, scuppers, gutters, or other drainage accessories accounting for existing rooftop obstructions. The contractor shall provide a tapered insulation layout plan in accordance with the specifications and local doe energy requirements, reviewed and designed by the insulation manufacturer, for approval by the owner / designer. Existing flashing height conditions may require modifications to the minimum and maximum design for each roof section. Contractor is to take all precautions to maintain a minimum flashing height to achieve the full coverage of the special project manufacturer’s warranty.

P. The roofing contractor is to place evenly distributed manufacturers recommended weights across the newly adhered insulation sheets to promote adhesion.

Q. If drains are to be replaced, new no-hub roof Z-100 drains or equal will be designed to replace the existing aged roof drains. The current adopted IBC is 2015, which exempts overflow scuppers from being required for new roof installations.

R. See construction plans and specifications for insulation type, R-value, and number of layers. Add new wood nailers, as required, to match new insulation thickness as designed by the insulation manufacturer for tapered applications at existing perimeters, penetrations, and rising wall conditions as designed. All roof curbs greater than 24” wide and set perpendicular to the roof slope shall be required to receive a tapered saddle to promote positive water flow. New wood nailers must be a set 1/4” below the finished roof surface at all gutter edges and primary scupper escutcheons.

S. All lumber in contact with concrete or masonry parapet wall is to be pressure treated except for plywood, U.O.N.

T. The wood blocking shown in the details and sections are graphic representations only. Solid continuous blocking shall be provided to match roof insulation at the thickest point and maintain the same elevation for the entire perimeter of the roof unless otherwise indicated.

U. Do not install wood nailers ahead of new roofing work. Only install nailers that can be covered the same day.

V. Counter sink all fasteners for wood blocking.

W. All existing wood blocking to remain is to be fastened with additional screws as per FM 1-49 placement. Pre-drill and set new securement using epoxy shields in masonry units and TEK fasteners in steel as required for positive attachment. Consult with professional fastener companies like Hilti, Triangle fasteners, etc. For additional guidance.

X. Secure top edge or termination of all membrane flashing using an aluminum termination bar secured 12-inches o.c., max. (detail shown on the project plans), and within 2-inches of each end. Prior to termination bar installation, install manufacturers recommended compression sealant behind flashing where termination bar will be placed. Apply manufacturers' approved sealant to the top edge of flashing and termination bar after proper mechanical attachment.

Y. All roof membrane details are to follow roof manufacturer's details for a 30-year warranty whether or not a 30-year warranty is required.

Z. Install manufacturers pre-fabricated inside and outside flashing corners following the recommendations and requirements of the roofing membrane manufacturer. Provide "t-joint covers" at the base of all vertical flashing / field seam intersections.

AA. The use of "penetration pans" or penetration pockets is not permitted unless the geometry of multiple penetrations is not sufficient for field wrapping and without prior owner approval.

BB. Extend all new membrane flashing up and over perimeter parapet wall under metal edge cleat to cover beyond the exterior of the wood nailer / parapet transition by 1 ½" minimum.

CC. Extend all new membrane flashing under roof metal edge to cover beyond the exterior of the wood nailer / parapet transition by 1 ½" minimum.

DD. Provide walkpads at the base and top of ladders, stairs, at roof access doors, at other roof access points, and at all serviceable mechanical unit doors or access panels.

EE. All roof deck penetrations and perimeter edges of the roof section will be required to receive a reinforced fire-stop sealant to prevent air and moisture drive into the new roof system.

FF. All wood supports for electrical conduit and gas line supports must be replaced with new Caddy, Miro, or equal premanufactured units to accommodate the new roof system.

GG. All new metal flashings for RTU counterflashing, cool stack base flashings, rain hoods, miscellaneous vertical wall flashing terminations, perimeter wall counterflashing, reglet metal, through wall and overflow wall scuppers are to be fabricated from 302 / 304 stainless unless indicated differently in the contract plans.

HH. All dissimilar metals to be separated by paint coat to avoid electrolytic reaction.

II. All stainless and copper metal field fabricated seams are to be soldered unless seam is indicated to be an expansion joint. Pre-finished galvanized or aluminum metals are to be sealed using approved sealant joints. All metal fabrications are to be completed using the latest SMACNA or copper and common-sense methods to resemble the construction details. Hem all metal edges.

JJ. All roof curbs are to meet the minimum flashing height requirements pre-approved by the new roof system manufacturer for the special project warranty. All required disconnections, reconnections and capping of mechanical, electrical, and plumbing equipment is to be completed in a safe working condition and shall be performed by a contractor licensed to perform the specified or indicated work.

KK. All mechanical, electrical and plumbing work to be performed by a licensed trade contractor within the jurisdiction of the contract facility's address.

LL. Temporarily remove all roof top equipment resting on roof surface or on existing equipment pads. Reinstall over walkpads, or raised to an alternative support curb, as shown in the contract plans when roofing work is complete.

MM. All security cameras must remain operational during the new roof installation.

NN. All lightning protection must remain intact during construction. Any dismantling of the cabling may require the contractor to re-certify the LP loop. Contractor is required to provide a photo catalogue of the existing conditions prior to commencement of work.

OO. All roof drains, wall drains, exterior ground leaders and scuppers must be water tested prior to commencement or mobilization for roof construction. The owner / consultant must be notified immediately of any drains or ground leaders found to be clogged. Contractor must document all testing and provide confirmation that all drains are clear prior to commencement of the new roof contract work.

PP. Inspect all heater stacks (b-vents) and replace defective / rusted piping above the roof with new 302/304 stainless steel insulated units to fit existing extensions.

QQ. All roof top condenser units are to be secured to the existing or new roof curbs in accordance with new FM Global requirements for roof top wind securement.

RR. All HVAC and RTU curbs, ductwork, electrical penetrations and gas supports shall be adjusted to accommodate the new roof insulation thickness. All roof curbs shall meet a min. 12" vertical height above finished roof, unless approved in writing by roofing manufacturer and design consultant.

SS. The Contract Documents showing the existing construction were prepared using limited field observations by the Consultant. Actual conditions may vary from those shown. Hidden

conditions may be discovered over the course of the work. Further investigations may uncover conditions which may require remedial attention prior to proceeding with demolition or construction. Contractor shall be aware of the need to proceed with diligence and care and shall notify Consultant of conditions which do not reflect those indicated or which require further testing and repair prior to proceeding. Contractor shall correct conditions that are detrimental to timely and proper execution of the Work. Contractor shall not proceed until unsatisfactory conditions have been corrected. Commencement or continuation of work constitutes acceptance of conditions and responsibility for satisfactory performance.

2.09 PERMITS

A. Contractor shall obtain all necessary permits from the local City or County Licensing and Permits Department and pay all required permit fees and use tax. The fees shall be included in the base price.

B. Schedule and complete any required pre-construction inspections.

C. Schedule and conduct mid roof inspection, if required.

D. Hoisting equipment, dumpsters, and portable toilets shall be provided by the contractor and fees or same shall be included in the base price.

2.10 WORKERS COMPENSATION AND LABOR TAXES

A. Provide the Owner with a Certificate of Insurance coverage for all workers employed by the Contractor. The Owner shall be named as an additional insured.

B. Provide the Owner with a Certificate of Insurance coverage for all sub-contractors employed by the Contractor.

C. All work performed in relation to this project will be conducted by employees of the Contractor and/or its hired sub-contractors and all applicable taxes and insurance on labor shall be paid and disclosed.

2.11 ROOF INSTALLATION

A. All work shall comply with the local and state adopted building codes. See the Scope of Work above for more details on the building code.

B. Job Site Protection
   1. Each day, measures shall be taken to reasonably protect the building, landscaping, property and personnel at the job site.

C. Safety
   1. All work shall be performed in compliance with current OSHA and EPA standards.
   2. Provide Owner with a project Safety Plan, which shall be posted on the job site during the work.

2.12 SELECTIVE DEMOLITION

A. Each days work shall be completed in full, with night tie ins in place. Work shall not be staged, nor roof left incomplete.

B. All drains are to be flow tested prior to work commencing. If any non-functional drains are discovered, the contractor shall notify all parties and the affected drain shall be made functional prior to work commencing.

C. Contractor is to provide insulation adhesive pull test results on all roof sections prior to material submittals. Report is to be certified by the manufacturer for the applicable roof system installation and warranty.

D. Contractor shall survey the job-site and surrounding area and note all conditions that will affect his work. Any pre-existing damage shall be documented using video and or photos. It is recommended documentation of all aspects of the site that may be impacted by construction prior to starting work be documented. This should include all sides of building, parking lot and interior of building and any other aspect that may be impacted by the roofing work.

2.13 PROJECT CONDITIONS

A. The building will be occupied and in use during construction. Take necessary precautions to create as little disturbance or disruption to the building and its occupants as possible during the work.

B. Supply, install, and maintain barriers, protection, warning lines, lighting, and personnel required to segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, its occupants, and the surrounding landscaped and paved areas. The Contractor shall observe all applicable OSHA requirements.

C. Schedule and execute work without exposing the building interior to the effects of inclement weather. Protect the building and its occupants against such risks and repair/replace work-related damage to the Owner's satisfaction.

D. Supply labor, equipment, tools and appliances necessary for the proper completion of the work.

E. Do not install roofing systems or sealants during precipitation, including fog, or when air temperature is below 40° F (4° C) or is expected to go below 40° F (4° C) during application, or when there is ice, frost, moisture, or visible dampness on the roof

F. Phased or temporary construction will only be permitted as specified. Schedule, execute, and coordinate work on a daily basis so that components are installed completely and permanently as specified.

G. Schedule, coordinate, and execute work to avoid traffic on completed roof areas. Coordinate work to prevent this situation by working away from completed roof areas, toward roof edges and access ways.

H. Roofing that is removed shall be made 100% weathertight in the same day's operations.

I. Roof construction and materials shall comply with these specifications and the latest editions of the following:
   1. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
   2. The National Roofing Contractors Association (NRCA) "Roofing and Waterproofing Manual"
   3. Underwriters Laboratories, Inc. "Roofing Materials and Systems Directory"
   4. Copper Development Association (CDA) publication "Copper in Architecture" Handbook.

J. All workmanship and materials shall be of the best construction practice. Should a conflict arise between the specification requirements and those of the referenced publications, the better quality or more stringent requirement will prevail. Specification requirements that exceed the minimum requirements of the manufacturer shall be complied with by the Contractor.

K. Coordinate the work in this Section with other Sections, including preparatory work, building protection, daily clean-up, and protection of building, and occupants.

L. Supply labor, vacuums, tools and appliances necessary to keep the interior and exterior building and site areas below and around the construction clean, with as little accumulation of dust and debris as possible on a daily basis.

PART 3 NEW ROOF

3.01 PREPARATION FOR NEW ROOFING

A. Auxiliary Roof Construction Materials:
   1. Lumber
      a. 2 x 6 minimum hem fir nailer anchored to the top of the parapet wall, fastened 36" o.c. max.
      b. 2 x 6 nailer at scupper locations, roof jacks, roof hatch and other details as needed to provide a nailing facility.
      c. 5/8" minimum Exterior Grade, Exposure 1 Plywood, CD Grade or better, one side sanded for smooth application of new roof flashing.
   2. Sheet Metal Flashing and Trim:

a. Downspouts:
    1) 24 ga. pre-finished galvanized steel with 20 year Kynar finish
    2) .040" prefinished aluminum with 20 year Kynar finish
b. Counter - Flashing:
    1) .018" 302/304 stainless
    2) 24 ga. pre-finished galvanized steel with 20 year Kynar finish
    3) .040" prefinished aluminum with 20 year Kynar finish
c. Roof Jacks / B-Vent Cool Pipe / Heater Stack Flashing:
    1) 26 ga. G-90 galvanized steel with mil finish with soldered seams
    2) .018" 302/304 stainless with soldered seams
d. Plumbing Vent Flashing:
    1) 2 lb. desilverized pig lead with soldered joints(BUR / Modified Bitumen roof systems only)
    2) Membrane manufacturers' pre-molded flashing
    3) PMMA reinforced liquid flashing (approved by roof system manufacturer)
e. Penetration Sealer Pans:
    1) 26 ga. G-90 galvanized steel with mil finish with soldered seams
    2) .018" 302/304 stainless with soldered seams

3. Accessories
    a. Furnish and install new Dura-Block rubber pipe supports spaced 8' o.c. max. as needed to replace all existing wood blocking conduit or horizontal piping supports.
    b. Reuse existing pre-manufactured pipe supports that are not damaged and suitable for the new roof elevation.
    c. Furnish and install new traffic protection pads around equipment and at access points on the roof.

3.02 DESCRIPTION OF SUPPLEMENTAL ALTERATION WORK

A. Scope of alterations work is described within the specifications and shown on drawings.

B. Roof Drain Plumbing: Alter existing system and add new construction, keeping existing in operation.

3.03 WARRANTY

A. **Engine 4:**

The new roofing/waterproofing shall be installed to comply with the requirements for the manufacturer’s standard 20 year (or more) NDL warranty, 10 year extension on material (30 year) and 5 year contractors workmanship guaranteed as defined by the MRCA..

B. **Engine 5:**

The new roofing/waterproofing shall be installed to comply with the requirements for the manufacturer’s standard 20 year (or more) NDL warranty, 10 year extension on material (30 year) and 5 year contractors workmanship guaranteed as defined by the MRCA..

C. **Engine 8:**

The new roofing/waterproofing shall be installed to comply with the requirements for the manufacturer’s standard 15 year (or more) NDL warranty, 5 year extension on material (20 year) and 5 year contractors workmanship guaranteed as defined by the MRCA.

D. **Engine 20:**

The new roofing/waterproofing shall be installed to comply with the requirements for the manufacturer’s standard 15 year (or more) NDL warranty, 5 year extension on material (20 year) and 5 year contractors workmanship guarantee as defined by the MRCA.

Upon completion of the work, contractor shall provide a manufacturer’s 15 year NDL watertight warranty to the owner.

E. **Engine 24:**

The new roofing/waterproofing shall be installed to comply with the requirements for the manufacturer's standard 20 year (or more) NDL warranty, 10 year extension on material (30 year) and 5 year contractors workmanship guaranteed as defined by the MRCA..

3.04 Final Inspection

1. Conduct final inspection with the owner's representative, roofing consultant and manufacturer's representative and correct any noted deficiencies.

3.05 Project Close-out and Payment

1. Applications for payments shall be made:
   a. using AIA payment application forms including a schedule of values, or
   b. the current Project Management program used by the Owners' PM team.
2. The first payment application may be submitted upon delivery of materials to the job site. Payment applications shall be submitted monthly or at the completion of the job.
3. All payment applications shall accompany a "Conditional Lien Release" and an "Unconditional Lien Release" for the amounts previously received.

END OF SECTION 01 1001

SECTION 01 3000
PROJECT ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electronic document submittal service.

B. Preconstruction meeting.

C. Progress meetings.

D. Contractor's daily reports.

E. Progress photographs.

F. Coordination drawings.

G. Submittals for review, information, and project closeout.

H. Number of copies of submittals.

I. Requests for Interpretation (RFI) procedures.

J. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 6000 - Product Requirements: General product requirements.

B. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.

C. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 REFERENCE STANDARDS

A. CSI/CSC Form 12.1A - Submittal Transmittal Current Edition.

B. CSI/CSC Form 13.2A - Request for Information Current Edition.

1.04 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Contractor is responsible for the following types of submittals to the DGS Project Manager and Designer:

1. Requests for Interpretation (RFI).
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports including fastener pull-out reports for perimeter nailer installation, peel test for 32 mil SBS vapor barrier applied to the concrete deck, and up-lift test for insulation attachment to the SBS vapor barrier. .
5. Manufacturer's instructions and field reports.
6. Applications for payment and change order requests.
7. Progress schedules.
8. Coordination drawings.
9. Correction of all Interim Project Punch Lists and the Final Combined Manufacturer's and Designers' Punch List. for Substantial Completion.
10. Closeout submittals.
11. As-built drawings with all project change order and RFI clarification updates
12. All Special Project Warranties.

1.05 PROJECT COORDINATOR

A. Project Coordinator: DGS Appointed Construction Manager.

B. During construction, coordinate use of site and facilities through the Project Coordinator.

C. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

D. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email. The DGS Project Manager may, at his or her discretion, request redundancy of submission via email or hard copies.
   1. This procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record. Contractor must provide personnel to be trained on the program being utilized by DGS at the time of this contract.
   2. It is Contractor's responsibility to submit documents in allowable format.
   3. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Submittal Service: The selected service is: Procore

C. Training: In person or web-based training session will be arranged for all participants. It is the Contractors responsibility to coordinate the training with DGS before the project starts.

3.02 PRECONSTRUCTION MEETING

A. DGS Project Manager will Schedule meeting after Notice of Award, or after the Contractor receives the Contract for the bid. The appointed DGS Project Manager will coordinate this meeting to be at the site of the project.

B. Attendance Required:
   1. Owner's Representative, or DGS Project Manager
   2. Designer.
   3. Contractor.
   4. Contractor's Safety Manager
   5. Major Subcontractors
   6. DCPS Agency Representative.
   7. DGS Procurement.

C. Agenda:
   1. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   2. Submission of initial Submittal schedule.
   3. Designation of personnel representing the parties to Contract, Owner's Representative, Agency Representative, Contractor, Contractor's Project Manager, Contractor's Site Superintendent, Contractor's Safety Manager, Contractor's Major Subcontractor(s), Contractor's Major Supplier,.
   4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   5. Scheduling.

D. Contractor is required to record minutes and distribute copies within two days after meeting to participants, with two copies to Designer, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Project Coordinator will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

B. Attendance Required:
   1. Contractor.
   2. Owner's Representative.
   3. Agency Representative.
   4. Designer / Quality Assurance Observer.
   5. Contractor's Superintendent.
   6. Contractor's Project Manager
   7. Major subcontractor(s) representative.

C. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of RFIs log and status of responses.
   6. Maintenance of progress schedule.
   7. Corrective measures to regain projected schedules.
   8. Planned progress during succeeding work period.
   9. Maintenance of quality and work standards.
   10. Effect of proposed changes on progress schedule and coordination.
   11. Other business relating to work.

D. Contractor is required to record minutes and distribute copies within two days after meeting to participants, with two copies to Designer, Owner, participants, and those affected by decisions made.

3.04 DAILY CONSTRUCTION REPORTS

A. Contractor is to include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel. Submit sample for approval and comment prior to the start of the project.

B. In addition to transmitting electronically a copy to Owner and Designer, submit two printed copies at approved intervals.
   1. Submit in format acceptable to Owner.

C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
   1. Date.
   2. High and low temperatures, and general weather conditions.
   3. Approximate count of personnel at Project site.
   4. Safety, environmental, or industrial relations incidents.
   5. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
   6. Signature of Contractor's authorized representative.

3.05 PROGRESS PHOTOGRAPHS

A. Photography Type: Digital; electronic files.

B. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Designer.

C. The absence of Pre-Construction photos / video will not be cause for dismissal of any damages to the facility, walkways, paving, grounds, or shrubs. The Owner will have the right to assess values to repair or correct any damage or deficiencies observed to be the result of the project construction, in the absence of the Contractor's pre-construction facility condition photos.

D. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: Via email.
   2. File Naming: Include project identification, date and time of view, and view identification.
   3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

3.06 COORDINATION DRAWINGS

A. Review submittal drawings prior to submission to Designer and Project Coordinator.

3.07 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
   2. Prepare using software provided by the Electronic Document Submittal Service.
   3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is preferred in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.

G. Review Time: Designer will respond and return RFIs to Contractor within three calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

1. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
2. Notify Designer within 2 calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.08 SUBMITTAL SCHEDULE

A. Submit to Designer for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule.

3.09 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Completed and signed Interim Correction Punch Lists for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
   1. All Project record documents.
   2. Contractor's Project daily reports with progress photos
   3. Operation and maintenance data.
   4. All Special Project Warranties.
   5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.10 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

END OF SECTION 01 3000 01 3000

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Regulatory Requirements

C. References and standards.

D. Testing and inspection agencies and services.

E. Control of installation.

F. Mock-ups.

G. Tolerances.

H. Manufacturers' field services.

I. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Project Administrative Requirements: Submittal procedures.

B. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 REGULATORY REQUIREMENTS

A. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Designer, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Designer.
   3. Contractor is to obtain from the manufacturer a letter of good standing and an acknowledgement that the manufacturer has reviewed the contract drawings and specifications, including the special project warranty and confirms that the Contractor can provide the merchantable installation of the product specified to achieve the warranty specified.

B. Comply with all applicable Federal, State and local codes and ordinances in force at the project site.

C. Apply, obtain and pay for required local and regional building permits and fees to legally execute the Work of this Contract.

D. Airborne asbestos fibers, lead and PCB compounds, if encountered, have been determined to be hazardous to one's health. Compliance with all possible Federal, State and Local regulations as they relate to handling these materials is the Contractor's responsibility.

E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Consultant, in quantities specified for Product Data.
   1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.04 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Designer before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Designer shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.05 INSTALLERS QUALITY ASSURANCE

A. Contractor shall submit with the bid documents, current applicators license for the materials to be supplied to meet or exceed the project specifications.

B. Contractor shall submit a letter on the manufacturer's letterhead dated within 2 weeks of the bid date confirming that the contractor is in good standing and can provide a completed warrantable installation in compliance with the bidding documents and addenda for this project.

C. Contractor shall take complete charge of the work under this contract and coordinate the work of all trades on the project.

D. Contractor shall identify a minimum of (1) one employee designated as the Quality Control Monitor over suppliers, manufacturers, products, services, site conditions and workmanship to produce Work of specified quality.

E. Should manufacturer's instructions conflict with Contract Documents, request and receive clarification from the Consultant before proceeding.

F. Manufacturer shall be required to provide copies of any and all project initial notification documents, field reports, or any communication with the installer as it relates to this project and the performance of the installation directed to the issuance of the final special project warranty.

G. Perform Work by persons certified to install the contracted roof system and to produce the required and specified quality installation.

H. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes or specified requirements indicate a higher standards or more precise workmanship.

I. Contractor shall obtain thorough data at the site and inspect surfaces that are to receive the Work before proceeding with fabricating, assembling, fitting or erecting of the work. The Contractor shall be solely responsible for the accuracy of measurements and laying out of the work and shall make good any errors, defects due to faulty measurements taken, information obtained, layout, or failure to report discrepancies.

J. The Contractor shall notify the Consultant in writing in case of discrepancies between existing work and drawings, and defects in such surfaces that are to receive the work. The Consultant will evaluate the notice, confer with the Project Coordinator and direct what remedial action will be taken.

K. Contractor shall apply, install, connect, erect, use, clean and condition manufactured articles, materials, and equipment as recommended by the manufacturer, unless specified to the contrary.

L. Testing and Inspection Agencies and Services

M. Owner will employ and pay for services of an independent testing agency to perform other specified testing.

N. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Designer before proceeding.

D. Contractor is responsible to provide daily progress reports including photo documentation of the overall production, construction details, and tie-in securement to the existing construction. A sample of the report requirements should be submitted with the project submittals.

E. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Have work performed by persons qualified to produce required and specified quality.

G. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

H. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

I. All applications will adhere to the manufacturers' specifications to meet or exceed the specified warranty term. Any and all "upgraded" scope of work requirements by the manufacturer to meet the warranty terms will be made part of this specification, expressed or implied at no cost to the Owner.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Notify Designer seven (7) working days in advance of dates and times when mock-ups will be constructed.

C. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

D. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

E. Accepted mock-ups shall be a comparison standard for the remaining Work.

F. Where mock-up has been accepted by Designer and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so by Designer.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturer's and industry standard tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Designer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Designer and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Designer and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Designer.
   6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Designer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Designer.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary. Manufacturer shall be responsible for physical site visits at the beginning of the project, interim inspections every two weeks, and at the closing of the project to provide a final punchlist. The manufacturers field technician shall be required to visit the site every 2 weeks, scheduled with the Designer and Contractor. All reports generated from the information gathered at the site visits will be required to be copied to the Designer.

B. Contractor to submit qualifications of manufacturer's inspector to Designer 10 days in advance of required observations.
   1. Manufacturer's inspector subject to approval of Designer.

C. Recorded observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to the specifications or manufacturers' written instructions must be submitted to the Designer for review and approval before implementation.

3.06 DEFECT ASSESSMENT

A. Contractor is responsible to replace work or portions of the Work not complying with specified requirements for the full 5-year term of the contractor's warranty.

B. The Owner may request testing of materials and/or installation to determine compliance with the specification. The Contractor shall pay for all costs associated.

C. Testing shall be accomplished by a testing firm designated by the Owner. Tests shall be conducted using recognized standards. The Consultant shall evaluate and issue a report to the Owner and Contractor regarding the results and provide recommendation for resolution.

D. If any test results indicate non-compliance with the specification the Contractor shall pay for all testing and associated reporting costs.

E. Replace Work or portions of the Work not conforming to specified requirements.

F. If, in the opinion of Designer, it is not practical to remove and replace the Work, Designer will direct an appropriate remedy or suggest to the Project Coordinator an adjusted payment option.

END OF SECTION 01 4000

SECTION 01 5010
TEMPORARY FACILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section includes requirements for the provision and utilization of temporary facilities to protect the Owner's property, the site, and construction materials, and for daily maintenance and cleanup of the site during the project.

1.02 CONTRACTOR'S USE OF EXISTING FACILITIES

A. Limit use of the premises to the work indicated, so as to allow for the Owner's uninterrupted occupancy and use. Confine operations to the areas indicated under the Contract. Conformance to the regulations set forth by the Owner regarding use of existing facilities is mandatory.
   1. Sanitary facilities shall be provided by the Contractor. Use of the building's sanitary facilities is not permitted.
      a. Owner will assist in controlling occupancy. Contractor shall provide and place portable barricades, as coordinated with the Owner, under work areas inside the building.
      b. Clean interior and exterior areas affected by the construction on a daily basis. Do not allow construction debris, waste materials, tools, excess packaging materials or other construction related materials to accumulate on the roof, in the facility, or on the exterior grounds and pavements.
      c. See Division 01 Section "Product Delivery Requirements" for product storage facilities and requirements.

1.03 UTILITIES

A. Electrical service will be provided to the Contractor free of charge by the Owner through exterior electrical outlets if available and operable. Use shall be limited to construction hours. The Owner reserves the right to charge the Contractor for excessive electrical service usage (i.e., wasteful usage). Should charges be considered, the Owner will notify the Contractor in writing of his intent,
   1. 48 hours in advance.

B. Water for construction purposes will be provided to the Contractor free of charge by the Owner through exterior water spigots if operable. The Owner reserves the right to charge the Contractor for excessive or wasteful use. Should charges be considered, the Owner will notify the Contractor in writing of his intent, 48 hours in advance. Drinking water shall be provided by the Contractor.

C. All other utilities required will be provided by the Contractor.

D. Plumbing, heating, and electrical work, including reinstallation of equipment and other work to be performed by the Contractor, shall be carried out without interference to the building's normal operation. Where work requires interruption of service, the Contractor shall make advance arrangements with the Owner for dealing with such interruption.

E. Ensure proper and safe operation and maintenance of utility systems within the construction limits, whether these are supplied by the Owner's distribution system or otherwise, until the work is accepted by the Owner. Maintain and operate appurtenances within the construction area that serve the distribution system, subject to periodic inspection by the Owner's operating personnel. Inspection by any representative or personnel of the Owner shall not relieve the Contractor of his responsibilities in connection with operation and maintenance of these facilities and equipment.

1.04 ACCESS

A. Provide ladders, scaffolding and staging as required to access the project area(s) in accordance with OSHA guidelines. Should damage to the building occur, restore damaged

areas to their original condition, clean up debris, and provide other access to the roof for the duration of the project.

B. Do not interfere with normal building operations. Coordinate activities with the Owner an d building occupants.

1.05 BARRIERS

A. Install temporary fencing, warning lines, barriers and guards, as required, to segregate t he construction areas from adjacent operational facilities, occupants and the public. In the event that access cannot be interrupted in the construction area, provide protection above doorways and walks in the construction area. Provide guard lights on barriers and lighting as necessary to prevent vandalism of work and storage areas. The Owner is not responsible for Contractor's losses due to damage or theft by vandals.

B. Install protective coverings at paving and building walls adjacent to hoist prior to starting work.
   1. Lap protective coverings at least 1 foot, secure against wind, and vent to prevent condensation of moisture on covered surfaces. Maintain the protective coverings in place for the duration of the project. Cover windows adjacent to Contractor operation areas with plywood.

1.06 TEMPORARY PROTECTION

A. Provide suitable Owner approved temporary protection to prevent the entrance of debris and obstructions into the building. Provide warning signs to reroute personnel around areas of dangerous work. Place warning barriers at roof perimeters and at deck openings. Clearly label temporary covers over deck openings. Do not permit openings to remain unprotected overnight. Schedule operations to allow for completion of new roofing over a predetermined area of roof within a day's work. Use special care to avoid damaging roofing and flashing when working on the roof of the building.

B. Provide temporary tie-ins between existing and new roof systems as specified and detailed. Tie-in construction shall completely prevent interior leaks, migration of moisture from existing to new
   1. construction and damage of any type to the facility. Provide necessary quality control at tie-ins on a daily basis to prevent leaks.

C. Avoid traffic on completed roof areas. Coordinate work to prevent this situation. Should temporary access be required, provide temporary substrate protection for trafficked areas.

D. Protect drainage systems from debris accumulation during construction. Ensure roof drains and leader pipes are not restricted when Contractor is not on site.

E. Protect materials scheduled to be reused from damage by placing them in labeled containers or wrappings stored in a weathertight trailer.

F. Provide temporary protection such as plywood and tarps for streets, drives, curbs, sidewalks, landscaping and existing exterior improvements during all phases of the project.

1.07 ROOFTOP PROTECTION

A. Provide plywood walkways, with 1/2-inch thick rubber walkway pad or 1-inch thick high density insulation protection beneath, for protection of new or existing roof areas which must be trafficked, and for roof membrane protection below demolition work which occurs above new or existing roof areas.

1.08 DEBRIS REMOVAL

A. The Owner shall designate crane and refuse container locations. These areas shall be sectioned off with proper warning lines.

B. Removed materials shall not be thrown freely from the roof but shall be lowered to the ground by crane in suitable containers or in an enclosed chute, in order to reduce the spread of dust and other debris.

C. Supply adequate covered receptacles for waste, debris and rubbish. One receptacle will be allowed on site at a time, and must be immediately removed from the site when full. Clean the project area daily and prior to moving the receptacle to another location on the site. Locations shall be as permitted by the Owner. Disposal shall be off-site in a legal dump authorized to accept construction demolition solid wastes.

1.09 WEATHER PROTECTION

A. Weather protection includes temporary protection of components adversely affected by moisture, wind, heat and cold by covering, patching, sealing, enclosing, ventilating, cooling and/or heating. Provide protection for locations within the project area as necessary, to protect the building and its contents, trafficked adjacent areas, new construction materials and accessories. The cost of heat, fuel and power necessary for proper weather protection shall be the responsibility of the Contractor. Installed weather protection shall comply with safety regulations, and provisions for adequate ventilation and fire protection.

1.10 VOLATILE MATERIALS

A. The Contractor is reminded that adhesives, solvents, bitumens, etc., are highly volatile a nd flammable materials. These materials, along with tools and applicators and rags, shall not be stored on or within the building. No overnight storage on the roof will be allowed. Do not transport materials through the building. Take precautions and closely follow the Specification requirements for fire protection on site during construction.

B. Locate and use flame-heated equipment so as not to endanger the structure, other materials on site, or adjacent property. Do not place flame-heated equipment on the roof. Locate and use flame-
heated equipment in specific areas approved by the Owner. Do not relocate flame-heated equipment without prior approval from the Owner.

C. The use of flame-heated equipment or torches on the roof is prohibited unless specifically approved in writing by the Owner.

1.11 FIRE PROTECTION

A. Provide necessary temporary fire protection for the building, its contents and materials during construction. Do not store combustibles inside the building or on the roof. Store adhesives, caulks and cleaning solvents away from the building using a method approved by local fire officials. Should cutting, burning or welding be necessary, provide a fire watch during operations and for four hours minimum after completion of the operations.

B. Do not use open flames near adhesives, caulks or cleaning solvents as they will readily ignite. Rags soaked with cleaning solvent shall not be discarded in the dumpsters, but shall be stored in a separate metal receptacle and removed from the site daily.

C. Comply with local fire codes and obtain permits necessary from the local fire department. Provide a copy to the Owner. Provide recently tested, fully charged fire extinguishers around the storage area, rubbish receptacle and two fire extinguishers on the roof within 50 feet of the Work.

1.12 INTERIOR PROTECTION AND RESTORATION

A. Protect and cover fixed items, furniture, equipment, appliances, fixtures, bookcases, etc. within the building below the work areas.

B. At the Owner's direction, remove portable furniture, equipment, appliances, fixtures, materials, stock, etc. within the building below the work area to an adjacent area for protection.

C. Remove, temporarily support, suspend and protect existing items requiring removal during the installation of the new work and properly replace these items to their original condition and to the Owner's satisfaction. These items include but are not limited to suspended ceilings, lighting fixtures, heating and air handling ductwork, electrical conduit, etc.

1.13 CLEAN-UP

A. Clean and restore interior building spaces beneath the work areas to original condition prior to the construction.

B. Debris, dust and dirt shall be swept completely clean at the joists, beams, overhead accessories and similar items. Those items soiled or stained from the work shall be cleaned and refinished.

C. Electrical fixtures damaged by the construction shall be replaced with an equal in shape, color, manufacturer, and capacity at no added expense to the Owner.

D. Interior ceiling finishes which are damaged by the construction shall be repaired or replaced with a system equal in color, texture, and finish at no added expense to the Owner.

E. Heavily soiled, stained or damaged floor areas will be cleaned, repaired and/or replaced by the Contractor at no additional cost to the Owner. All interior areas where interior work was performed will also be swept and vacuumed completely clean of dust, dirt and debris. The Owner will wash and rewax floors, but only as part of a normal or routine maintenance procedure.

F. Open ducts, grills, thermostats, electric boxes or similar fixtures and items which may have been soiled or affected by the work or which might conduct dust to other areas shall be masked, protected and cleaned by the Contractor.

G. Windows, blinds, curtains, shelving, edges, lighting, etc. shall be cleaned to their original condition prior to the start of the roof renovation, and to the satisfaction of the Owner.

H. Remove completely temporary protection materials and facilities from the site upon completion of the work and demobilization of the project.

I. Restore streets, drives, curbs, sidewalks, landscaping and existing improvements disturbed by the construction operations to their condition at the start of the work.

1.14 NOTIFICATION

A. Notify the Owner's Representative at least 72 hours in advance of the desire to extend, connect, disconnect, turn on or off HVAC, steam, electric, water or other service from the Owner's supply systems. The actual operation shall be witnessed by authorized representatives of the Owner. Plumbing, heating and electrical work, including installation of equipment and any other work to be performed by the Contractor, shall be carried out without interference with the Owner's normal operation. Where work requires interruption of a service, make advance arrangements with the Owner for dealing with such interruption.

1.15 VEHICLES

A. Acceptable areas for the locations of the Contractor's vehicles shall be as designated by the Owner.
   1. No other areas may be utilized without the Owner's permission.

1.16 WALKWAY COVERING

A. The Contractor will be required to provide walkway coverings when construction traffic or access crosses a normal path from the building to exterior activities or access to the building by students or staff. The walkway coverings must protect a clear path for access and egress above entrances which must remain accessible. The framework supporting the walkway covering shall be free-standing and well braced. The roof covering and support framing shall be designed to support a minimum live load of 150 psf, or as stated in the current local code, whichever is greater. The roof coverings shall be of width sufficient to cover the entire walkway or sidewalk. A minimum height clearance of 6-feet, 8-inches, or as required to allow building doors to open, shall be maintained below coverings. Should coverings obscure the building’s address, a temporary address shall be installed so as to be visible from the street. Lettering shall be approved by the Owner. Protection shall be in accordance with all applicable OSHA standards.

PART 2 - PRODUCTS

2.01 2.1 MATERIALS

A. Portable Chain-Link (Site Enclosure) Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 8-feet high with galvanized steel pipe posts; minimum 2-
   1. 3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Provide concrete bases for supporting posts.

B. Lumber and Plywood: Unless noted otherwise, comply with requirements in Division 06
   1. Section “Rough Carpentry.”

2.02 TEMPORARY FACILITIES

A. General: Maintain all temporary facilities and controls necessary for the performance of the Work. Comply with all applicable codes and regulations of authorities having jurisdiction; obtain permits as required. Locate and install all facilities and controls where acceptable to the local authorities having jurisdiction, utility, and Owner and remove same and terminate, in a manner suitable to the utility owner, at completion of the Work or when otherwise directed. Pay all costs associated with the provision and maintenance of temporary facilities and controls including power, water, and fuel (if any) consumed until Substantial Completion.

B. Storage and Staging Areas: The Contractor shall be responsible for coordination, protection, and safekeeping of products stored on site under this Contract including soil cut and fill. Refer to Contract Documents for any defined staging areas.
   1. Move stored products that interfere with construction of the Work, or operations of the
   2. Owner or separate contractors.
   3. Obtain any pay for use of additional storage or staging areas as needed for the Work.
   4. Provide storage areas sized to storage requirements for products of individual Sections, allowing for access and orderly maintenance and inspection of products.

2.03 EQUIPMENT

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

B. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide UL Listed or FM approved vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

2.04 PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 5000

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations.

1.02 PRODUCT DELIVERY REQUIREMENTS

A. A. Contractor or the Contractor's authorized representative must be present to accept delivery of all equipment and material shipments. The Owner will not knowingly accept, unload or store anything delivered to the site for the Contractor's use. Inadvertent acceptance of delivered items by any representative or employee of the Owner shall not constitute acceptance or responsibility for any of the materials or equipment. It shall be the Contractor's responsibility to assume liability for equipment or material delivered to the job site.

1.03 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Contractor shall confine equipment, apparatus, storage of materials and operations to limits indicated on the drawings or agreed to by the Owner at the pre-construction meeting. Contractor shall not bring material onto the site until they are needed for the progress of the work.

B. The storage of materials on the grounds shall be in strict accordance with the instructions stated within the technical sections. Storage of materials on the roof shall at no time exceed the design carrying capacity of the structural system.

C. All hazardous materials, including motor fuels, shall be properly handled and contained to prevent spills or other releases. The Contractor shall develop and maintain a contingency plan to provide emergency response, containment, and cleanup of spills of hazardous materials resulting from contract activities. All spills and releases shall be reported to the Owner.

1.04 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Product quality monitoring.

1.05 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Notice to Proceed.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Sheet metal fabrication submittals are to be submitted for review and comment prior to order submission and fabrication

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made outside the United States, its territories, Canada, or Mexico.

C. Where other criteria are met, Contractor shall give preference to products that:
   1. Have longer documented life span under normal use.
   2. Are made of recyclable materials.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period and the documents required.

B. Substitutions will be considered when a product, through no fault of the Contractor, becomes unavailable or unsuitable due to regulatory change.

C. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure (after contract award):
   1. Designer will notify Contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Do not store products directly on the ground.

I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

J. Prevent contact with material that may cause corrosion, discoloration, or staining.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 01 6000

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for new roof system installation including OEM roof maintenance, scheduled roof cleanings, inspections, warranties and, certification of structural modifications or alterations. .

C. Pre-installation meetings.

D. Cutting and patching.

E. Post construction cleaning and protection.

F. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

G. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Project Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

C. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

1.03 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Date and time work will be executed.

1.04 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.

1.05 PROJECT CONDITIONS

A. Ventilate enclosed or confined areas adjacent air intakes to assist cure of materials, and to prevent accumulation of dust, fumes, vapors, or gases.

B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Coordinate completion and clean-up of work of separate sections.

C. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.07 CLOSEOUT SUBMITTALS

A. Upon "Substantial Completion" of project, the Contractor shall submit the below listed item to the Consultant for presentation to the Owner.
   1. 15 year Manufacturer's no dollar limit (NDL) system warranty, with a separate 5 year Material Only warranty.
   2. 30 year sheet metal Manufacturer's finish warranty.
   3. Five (5) year Contractor's material and labor warranty.
   4. Waste manifests (for ACM), if applicable.
   5. Contractor’s as-built drawings showing changes to the contract documents, if applicable.
   6. Signed Manufacturer's Warranty Inspection punch list, indicating completion of any outstanding items.
   7. Such other written guarantees or warranties, as required by the technical sections.
   8. Final Waivers of Lien.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Contractor is responsible for documenting all existing conditions to capture any pre-construction damages that need to be acknowledged by DGS. Absence of said documentation will not absolve Contractor of responsibility for required repairs to items listed in the project punch list(s). Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Designer four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Contractor is to record minutes and distribute copies within two days after meeting to participants, with two copies to Designer, Owner, participants, and those affected by decisions made.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Designer before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Maintain a weatherproof roof on the exterior building enclosure.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove no more roofing and weatherproofing than can be made watertight the same day.
   3. Remove items indicated on drawings or addendum sketches
   4. Relocate items indicated on drawings or addendum sketches.
   5. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   6. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and lightning protection system): Remove, relocate, and extend existing systems to accommodate new construction.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    b. Provide temporary connections as required to maintain existing systems in service.
4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

E. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. Where a change of plane of 3/16" inch (4.75 mm) or more occurs in existing work, infill with manufacturers' approved insulation or "fill" materials to make transition acceptable for a warrantable installation..

G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

H. Refinish existing surfaces as indicated:
1. Where interior spaces are indicated to be refinished due to alterations or modifications to work specified in other sections, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match. All final alterations must be reviewed and approved by Consultant prior to commencement of closing or finishing the subject area(s)

I. Clean existing systems and equipment.

J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

K. Do not begin new construction in alterations areas before demolition is complete.

L. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.

7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products, equal or better than existing, in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Apply fire stop sealant to any roof deck penetration revealed upon demolition of the existing roof system,

H. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate, to an equal or better condition, prior to repairing finish.

3.07 PROGRESS CLEANING

A. Maintain all roof areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped areas, unless specifically approved by Owner, in writing.

H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.10 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Use cleaning materials that are nonhazardous.

C. If interior areas were affected by this scope of work or additional work contracted by adjustments to the contract, clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.11 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Designer and Owner.

B. Notify Designer when work is considered ready for Designer's Substantial Completion inspection.
   1. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Designer's Substantial Completion inspection.

C. Conduct Substantial Completion inspection and create Final Correction Punch List containing Designer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Designer.

D. Notify Designer when work is considered finally complete and ready for Designer's Substantial Completion final inspection.

E. Complete items of work determined by Designer listed in executed Certificate of Substantial Completion.

3.12 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than 5 years from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 01 7000

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Project Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Designer with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Designer comments. Revise content of all document sets as required prior to final submission.

C. Warranties and Bonds:
   1. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   2. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. As-built drawings to contain all field and design changes not limited to; the specified roof system, perimeter architectural metal system, pre-manufactured supports, MEP modifications or alterations, masonry and/or structural alterations or modifications.
2. Field changes of dimension and detail.
3. Details not on original Contract drawings.

3.02 WARRANTIES

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

F. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

END OF SECTION 01 7800

SECTION 02 4100
DEMOLITION - ENGINE 4, 5, 8, 20 & 24

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

B. **Engine 4: Summary Project Description:** This project includes a roof replacement with a new UL Class A, 60 mil TPO / PVC insulated roof system on all low sloped roof areas, A, B C and D to achieve a minimum 20 -year NDL warranty.

C. **Engine 5: Summary Project Description:** This project includes a roof replacement with a new UL Class A, 60 mil TPO / PVC insulated roof system on all low sloped roof areas, A, and B to achieve a minimum 20 -year NDL warranty.

D. Installation of a new totally adhered nominal 60 mil Textured PVC roof system (or equal) installed in accordance with the manufacturers specifications as modified hereinafter to provide a special project warranty which includes a 20 year NDL warranty.

E. Clean the existing roof drains including, but not limited to; drain basket, drain clamping ring and accessories and cast drain bowl.

F. Remove all discarded roof top equipment to be identified in the pre-bid site walk.

G. Inspect the existing concrete deck and wood nailers for repair and/or replacement. Contractor will be required to document all repair/ replacements in the submitted daily reports.

H. Disconnect and raise roof top units, duct work and supporting structures where indicated and/or as needed to provide the minimum vertical flashing height for a warranted installation.

I. All abandoned roof penetrations, equipment pads and curbs will be identified to be removed, decked-in or capped at the preference of the Owner.

J. Verify use of telecommunication antenna(s), if any. Remove abandoned antenna(s). Make all necessary arrangements for coordination of interruption on services.

K. Provide new counterflashing and raise at all locations where the finished roof flashing height is less than 8” (inches).

L. Provide new condensate and RTU support stands if shown on the drawings.

M. Provide new treated wood blocking at perimeter edges, expansion joints, walls and penetrations.

N. Provide tapered insulation, flat thermal insulation, thermal barriers and cover boards as specified.

O. Provide perimeter and penetration sheet metal flashings and counter flashings, and miscellaneous sheet metal fabrications.

P. Provide metal fan curbs, roof top unit curbs, conduit and duct supports as necessary.

Q. Remove existing failed sealant and components at all building joints adjacent to new roof installations. Provide new backer rod and sealant where indicated and as required at all building expansion joints above new roof installations.

R. Disconnect and reconnect existing mechanical/electrical components to restore proper operation to rooftop equipment following roof top unit modifications to accommodate the new roof installation.

S. All perimeter edge metal will be manufactured and supplied in compliance with the roofing manufacturers' special project warranty to incorporate a 30 year finish warranty with a limited 120 mph wind warranty.

T. **Engine 8: Summary Project Description:** This project includes specified recover of the existing roof system on Roof Area A; Furnish and install a new 60 mil, TPO membrane roof recover system. The new recover roof system will provide a 10-year NDL warranty.

U. Clean the existing roof drains including, but not limited to; drain basket, drain clamping ring and accessories and cast drain bowl. Existing roof drain strainers, rings and bolts are to be new as designated in the contract drawings.

V. Remove all discarded roof top equipment to be identified in the pre-bid site walk.

W. Disconnect and raise roof top units, duct work and supporting structures where indicated and/or as needed to provide the minimum vertical flashing height for a warranted installation.

X. All abandoned roof penetrations, equipment pads and curbs will be identified to be removed, decked-in or capped at the preference of DGS Facility Managers.

Y. Verify use of telecommunication antenna(s). Make all necessary arrangements for coordination of interruption on services.

Z. Provide new counterflashing and raise at all locations where the finished roof flashing height is less than 8" (inches).

AA. Provide new condensate and RTU support stands if shown on the drawings.

BB. Provide new treated wood blocking at perimeter edges, expansion joints, walls and penetrations.

CC. Provide perimeter and penetration sheet metal flashings and counterflashings, and miscellaneous sheet metal fabrications.

DD. Provide metal fan curbs, roof top unit curbs, conduit and duct supports as necessary.

EE. Remove existing failed sealant and components at all building joints adjacent new roof installations. Provide new backer rod and sealant where indicated and as required at all building expansion joints above new roof installations.

FF. Disconnect and reconnect existing mechanical/electrical components to restore proper operation to rooftop equipment following roof top unit modifications to accommodate the new roof installation.

GG. **Engine 20: Summary Project Description:** This project includes roof coating system at Area D with a new urethane traffic coating with a minimum 10-year NDL warranty. Work also includes restoration and repairs of cap and pan clay tile at Area B and standing seam metal roofing at Area C as well as repair of gutters and downspouts at Areas B and C with contractor's maximum installation and repair warranty. Roof Area A is not included in the scope of work.

HH. Clean the existing roof drains including, but not limited to; drain basket, drain clamping ring and accessories and cast drain bowl.
    1. Remove all discarded roof top equipment to be identified in the pre-bid site walk.

II. Disconnect and raise roof top units, duct work and supporting structures where indicated and/or as needed to provide the minimum vertical flashing height for a warranted installation.

JJ. All abandoned roof penetrations, equipment pads and curbs will be identified to be removed, decked-in or capped at the preference of the Owner.

KK. Verify use of telecommunication antenna(s), if any. Remove abandoned antenna(s). Make all necessary arrangements for coordination of interruption on services.

LL. Provide perimeter and penetration sheet metal flashings and counter flashings, and miscellaneous sheet metal fabrications.

MM. Provide metal fan curbs, roof top unit curbs, conduit and duct supports as necessary.

NN. Remove existing failed sealant and components at all building joints adjacent to new roof installations. Provide new backer rod and sealant where indicated and as required at all building expansion joints above new roof installations.

OO. Disconnect and reconnect existing mechanical/electrical components to restore proper operation to rooftop equipment following roof top unit modifications to accommodate the new roof installation.

PP. All perimeter edge metal will be manufactured and supplied in compliance with the roofing manufacturers' special project warranty to incorporate a 30 year finish warranty with a limited 120 mph wind warranty.

QQ. **Engine 24: Summary Project Description:** This project includes capital roof replacement at Areas A, C, D and F with a 80 mil fully adhered PVC membrane assembly with a minimum 25-year NDL warranty. Work also includes capital roof refurbishment of clay tile as well as repair of gutters and downspouts at Areas B and E with contractor's maximum installation and repair warranty.

RR. Installation of a new totally adhered nominal 80 mil Textured PVC roof system (or equal) installed in accordance with the manufacturers specifications as modified hereinafter to provide a special project warranty which includes a 20 year NDL warranty.

SS. Remove the existing aggregate on the asphalt Built-Up roof. Remove existing roof system down to the concrete deck.

TT. Clean the existing roof drains including, but not limited to; drain basket, drain clamping ring and accessories and cast drain bowl.

UU. Remove all discarded roof top equipment to be identified in the pre-bid site walk.

VV. Inspect the existing concrete deck and wood nailers for repair and/or replacement. Contractor will be required to document all repair/ replacements in the submitted daily reports.

WW. Disconnect and raise roof top units, duct work and supporting structures where indicated and/or as needed to provide the minimum vertical flashing height for a warranted installation.

XX. All abandoned roof penetrations, equipment pads and curbs will be identified to be removed, decked-in or capped at the preference of the Owner.

YY. Verify use of telecommunication antenna(s), if any. Remove abandoned antenna(s). Make all necessary arrangements for coordination of interruption on services.

ZZ. Provide new counterflashing and raise at all locations where the finished roof flashing height is less than 8" (inches).

AAA. Provide new condensate and RTU support stands if shown on the drawings.

BBB. Provide new treated wood blocking at perimeter edges, expansion joints, walls and penetrations.

CCC. Provide tapered insulation, flat thermal insulation, thermal barriers and cover boards as specified.

DDD. Provide perimeter and penetration sheet metal flashings and counter flashings, and miscellaneous sheet metal fabrications.

EEE. Provide metal fan curbs, roof top unit curbs, conduit and duct supports as necessary.

FFF. Remove existing failed sealant and components at all building joints adjacent to new roof installations. Provide new backer rod and sealant where indicated and as required at all building expansion joints above new roof installations.

GGG. Disconnect and reconnect existing mechanical/electrical components to restore proper operation to rooftop equipment following roof top unit modifications to accommodate the new roof installation.

HHH. All perimeter edge metal will be manufactured and supplied in compliance with the roofing manufacturers' special project warranty to incorporate a 30 year finish warranty with a limited 120 mph wind warranty.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

1.04 SUBMITTALS

A. Site Plan: Showing:
   1. Areas for temporary construction and field offices.
   2. Scheduled demolition sections with dates and estimated area quantities.
   3. Roof access and egress locations.
   4. Predemolition Videotapes: Show existing conditions of adjoining construction and sit e improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Proposed locations of chutes, dumpsters, cranes, hoists, and other temporary equipment or facilities required for demolition work.
   3. Proposed methods for interior and exterior protection and clean-up during removal and re-roofing operations.
   4. Include a Site Specific JHA / AHA and summary of safety procedures.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.
   1. MEP Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
   2. Standards: Comply with ANSI A10.6 and NFPA 241; OSHA, 29 CFR 1926.1101; EPA, NESHAP 40 CFR, Part 60, DOT 49 CFR, Parts 171 and 172.
   3. Comply with State and Local requirements.

PART 2 EXECUTION

2.01 LOW SLOPE ROOF SCOPE

A. Remove items indicated, for roofing, sheet metal trim and roof top equipment to be marked or identified for removal.

B. Chutes: Provide enclosed chutes for debris transfer from roof areas at height of 10-feet or more. Do not allow debris to spill from bottom of chute directly onto ground. Direct chutes into approved construction debris container (dumpster). Control and contain dust and noise from falling debris by use of breaks in vertical alignment of chute or tarps covering dumpster. Provide hose with nozzle near chute outlet to wet debris, as necessary, for dust control.

C. Hoists/Cranes: Provide hoists or cranes to remove debris and transport materials to and from roof. Secure materials to prevent loss during lifting. Place debris transported from roof directly in approved construction debris containers. Provide proper protection of wall areas for entire height directly adjacent to or under area of hoisting.

D. Use of “bobcat” type removal equipment on roof is prohibited.

E. Mechanical cutting equipment: Roof cutting equipment shall be equipped with operable blade depth setting mechanisms to control cutting depth of blade and prevent damage to structural deck during cutting operations.

2.02 STEEP SLOPE ROOF SCOPE

A. Remove items indicated, for roofing, sheet metal trim as identified in the project plans for repair.

2.03 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain all required permits.

2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
3. Provide, erect, and maintain temporary barriers and security devices.
4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
6. Do not close or obstruct roadways or sidewalks without permit.
7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. During removal of existing roofing and related materials, report to Owner areas of damaged, deteriorated, or otherwise unsuitable structural deck or framing materials exposed during work. Do not cover or remove unacceptable deck or framing areas until reviewed by Owner. Provide temporary protection to areas in question. Use care in removal of membrane flashings and decking to prevent damage to substrates.

D. Do not remove more material than can be replaced in one day with the new specified roof system.

E. Set cutting blades of mechanical cutting equipment to proper depth to prevent scoring or damage to structural deck. Use care in removal of membrane flashing to prevent damage to substrates.

F. Remove roof materials down to structural deck. Sweep, clean and vacuum debris from deck surfaces, including flutes of steel deck.

G. Control visible emissions during roof removal and at dumpster level.

H. Take precautions to prevent water on or within existing roof system from migrating into building or new roof system.

I. Protect existing structures and other elements that are not to be removed.
1. Stop work immediately if adjacent structures appear to be in danger.

J. If hazardous materials are discovered during removal operations, stop work and notify Designer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

K. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.

2.04 EXISTING UTILITIES

A. Protect existing utilities to remain from damage.

B. Do not disrupt public utilities without permit from Owner having jurisdiction.

C. This project includes the removal of the existing solar array for off-site storage and re-installation after the roof replacement has been completed. Protection of the solar panels will be the sole responsibility of the contractor for proper re-installation to a productive certified working condition.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

2.05 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Designer before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Maintain existing roof system in a weatherproof/watertight condition during the execution of this contract. No more roofing materials will be allowed to be removed than can be replaced and made watertight within the same work day.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove deteriorated wood, corroded metals, compromised roof deck and deteriorated masonry and concrete; replace with new construction specified.
   2. Contractor will be required to document all repair/replacements in the submitted daily reports.
   3. Remove items indicated on drawings.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

2.06 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site, daily.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02 4100

SECTION 03 0100
MAINTENANCE OF CONCRETE - ENGINE 4, 20 & 24

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cleaning of existing concrete surfaces.

B. Repair of exposed structural, shrinkage, and settlement cracks.

C. Resurfacing of concrete surfaces having spalled areas and other damage.

1.02 REFERENCE STANDARDS

A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.

B. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2016.

C. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars 2017.

D. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement 2016.

E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.

G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.

H. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens) 2020b.

I. ASTM C150/C150M - Standard Specification for Portland Cement 2020.

J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.

K. ASTM C928/C928M - Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs 2020a.

L. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2013.

1.03 SUBMITTALS

A. Product Data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with minimum of 5 years of documented experience.

1.05 MOCK-UP(S)

A. Test each type of maintenance procedure required on each type of existing construction, to determine the most appropriate procedures to use and as a record of expected results.

B. Horizontal Surface Repair: Total of 10 foot (3 m) square area, demonstrating each type of repair.

C. Where color or texture matching is required, first prepare a small size sample on cementitious board.

D. Locate mock-up(s) where directed.

E. Re-work mock-up(s) until satisfactory to Designer.

F. Satisfactory mock-up(s) may remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturers' instructions for storage, shelf life limitations, and handling of products.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

A. Degreaser:
   1. Manufacturers:
      a. L&M Construction Chemicals, Inc, a subsidiary of Laticrete International, Inc; CITREX: www.lmcc.com/#sle.
      b. SpecChem, LLC; Orange Peel-Citrus Cleaner: www.specchemllc.com/#sle.
      c. R. Meadows, Inc: www.wrmeadows.com/#sle.

B. Detergent: Non-ionic detergent.

2.02 CEMENTITIOUS PATCHING AND REPAIR MATERIALS

A. Manufacturers:
   1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   2. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
   3. Kaufman Products Inc: www.kaufmanproducts.net/#sle.
   4. Prospec, an Oldcastle brand: www.prospec.com/#sle.
   5. The QUIKRETE Companies: www.quikrete.com/#sle.
   6. SpecChem, LLC: www.specchemllc.com/#sle.
   7. R. Meadows, Inc: www.wrmeadows.com/#sle.
   8. Substitutions: See Section 01 6000 - Product Requirements.

B. Bonding Slurry: Water-based latex admixture complying with ASTM C1059/C1059M, combined with Portland cement and sand in accordance with admixture manufacturer's instructions.
   1. Admixture Manufacturers:
      a. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
      b. The QUIKRETE Companies; QUIKRETE® Concrete Bonding Adhesive: www.quikrete.com/#sle.
      c. SpecChem, LLC; Strong Bond - Acrylic Bonder: www.specchemllc.com/#sle.
      d. R. Meadows, Inc; Acry-lok: www.wrmeadows.com/#sle.
      e. Substitutions: See Section 01 6000 - Product Requirements.

C. Cementitious Resurfacing Mortar: One- or two-component, factory-mixed, polymer-modified cementitious mortar designed for continuous thin-coat application.
   1. Mixed with water or latex type bonding agent in proportions as recommended by manufacturer.
   2. Integral corrosion inhibitor.
   3. Recommended Thickness: Feather edge to 1/8 inch (Feather edge to 3 mm).
   4. Color: Gray.
   5. Manufacturers:
      a. Dayton Superior Corporation; Recrete 20 Minute: www.daytonsuperior.com/#sle.
      b. Kaufman Products Inc; Patchwell: www.kaufmanproducts.net/#sle.
      c. The QUIKRETE Companies; QUIKRETE® Concrete Resurfacer: www.quikrete.com/#sle.
      d. SpecChem, LLC: Duo Patch: www.specchemllc.com/#sle.
      e. R. Meadows, Inc; Meadow-Patch T2: www.wrmeadows.com/#sle.
      f. Substitutions: See Section 01 6000 - Product Requirements.

D. Cementitious Repair Mortar, Trowel Grade: One- or two-component, factory-mixed, polymer-modified cementitious mortar.

1. In-place material resistant to freeze/thaw conditions.
2. Mixed with water or latex type bonding agent in proportions as recommended by manufacturer.
3. Dry Material: Complies with ASTM C928/C928M.
4. Integral corrosion inhibitor.
5. Products:
    a. Dayton Superior Corporation; Special Patch: www.daytonsuperior.com/#sle.
    b. Kaufman Products Inc; Patchwell V/O: www.kaufmanproducts.net/#sle.
    c. The QUIKRETE Companies; QUIKRETE® FastSet Repair Mortar: www.quikrete.com/#sle.
    d. SpecChem, LLC; Duo Patch: www.specchemllc.com/#sle.

E. Pre-Blended Concrete Mix for Small Projects: Construction-grade Portland cement uniformly blended with aggregates and other approved concrete ingredients, requiring only the addition of water.
1. Compressive Strength: 4000 pounds per square inch (27.6 MPa), minimum, at 28 days, when tested in accordance with ASTM C39/C39M.
2. Manufacturers:
    a. The QUIKRETE Companies; QUIKRETE® Fast Set Concrete Mix: www.quikrete.com/#sle.

2.03 ACCESSORIES

A. Anchoring Adhesive: Self-leveling or non-sag as applicable.
1. Self-Leveling Epoxy Products:
2. Non-Sag Epoxy Products:

B. Portland Cement: ASTM C150/C150M, Type I, grey.

C. Sand: ASTM C33/C33M or ASTM C404; uniformly graded, clean.

D. Water: Clean and potable.

E. Reinforcing Steel: Deformed bars, ASTM A996/A996M Grade 40 (280), Type A.
1. Epoxy coated in accordance with ASTM A775/A775M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means acceptance of substrate.

3.02 CLEANING EXISTING CONCRETE

A. Provide enclosures, barricades, and other temporary construction as required to protect adjacent work from damage.

B. Clean concrete surfaces of dirt or other contamination using the gentlest method that is effective.
1. Try the gentlest method first, then, if not clean enough, use a less gentle method taking care to watch for impending damage.
2. Clean out cracks and voids using same methods.

C. The following are acceptable cleaning methods, in order from gentlest to less gentle:
1. Water washing using low-pressure, maximum of 100 psi, and, if necessary, brushes with natural or synthetic bristles.
2. Increasing the water washing pressure to maximum of 400 psi.
3. Adding detergent to washing water; with final water rinse to remove residual detergent.
4. Steam-generated low-pressure hot-water washing.

3.03 CONCRETE SURFACE REPAIR USING CEMENTITIOUS MATERIALS

A. Clean concrete surfaces, cracks, and joints of dirt, laitance, corrosion, and other contamination using method(s) specified above and allow to dry.

B. Apply coating of bonding agent to entire concrete surface to be repaired.

C. Fill voids with cementitious mortar flush with surface.

D. Apply repair mortar by steel trowel to a minimum thickness of 1/4 inch (6 mm) over entire surface, terminating at a vertical change in plane on all sides.

E. Trowel finish to match adjacent concrete surfaces.

END OF SECTION 03 0100

SECTION 04 0100
MAINTENANCE OF MASONRY - ENGINE 5

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Replacement of Concrete Masonry units.

B. Replacement of Brick

C. Pointing mortar joints (related to the coping stone and brick).

D. Repair of damaged masonry.

E. Setting of parapet pre-cast coping stone(s)

1.02 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

1.04 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
   1. Maintain one copy of each document on project site.

1.06 MOCK-UP

A. Locate loose coping stones as directed during the pre-bid walk-through.

B. Acceptable panel / setting will become the standard for work of this section.

C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store all masonry grout and mortar mix in a dry storage unit on site.

1.08 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

B. Maintain materials and surrounding air temperature to minimum 40 degrees F (5 degrees C) prior to, during, and 48 hours after completion of masonry work.

C. Maintain materials and surrounding air temperature to maximum 90 degrees F (32 degrees C) prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 MORTAR MATERIALS

A. Type K mortars are 1 part portland cement, 4 parts hydrated lime and 111/4 to 15 parts fine sand.

B. Tuckpointing mortar to be in compliance with ASTM C270

2.03 MASONRY MATERIALS

A. Brick: Section 04 2000.

B. Block: Section 04 2000.

PART 3 EXECUTION

3.01 PREPARATION

A. Protect surrounding elements from damage due to restoration procedures.

B. Carefully remove and store removable items located in areas to be restored, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.

C. Separate areas to be protected from restoration areas using means adequate to prevent damage.

D. Cover existing landscaping with tarpaulins or similar covers.

E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

F. Close off adjacent occupied areas with dust proof and weatherproof partitions.

G. Protect roof membrane and flashings from damage with 1/2 inch (13 mm) plywood laid on roof surfaces over full extent of work area and traffic route.

3.02 JOB CONDITIONS

A. Protection: Protect newly pointed joints from rain, until pointed joints are sufficiently hard enough to prevent damage.

B. Cold Weather Protection:
   1. Tuck pointing may be performed in freezing weather when methods of protection are utilized.
   2. Comply with applicable sections of "Recommended Practices for Cold Weather Construction" as published by International Masonry Industry All Weather Council.
   3. Existing surfaces at temperatures to prevent mortar from freezing or causing other damage to mortar.

3.03 REBUILDING

A. Cut out damaged and deteriorated masonry with care in a manner to prevent damage to any adjacent remaining materials.

B. Support structure as necessary in advance of cutting out units.

C. Cut away loose or unsound adjoining masonry as directed.

D. Build in new units following procedures for new work specified in other section(s).

E. Mortar Mix: Colored and proportioned to match existing work.

F. Ensure that anchors are correctly located and built in.

G. Install built in masonry work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in all openings, accessories and fittings.

3.04 REPOINTING

A. Perform repointing prior to cleaning masonry surfaces.

B. Cut out loose or disintegrated mortar in joints to minimum 1/2 inch (6 mm) depth or until sound mortar is reached.

C. Use power tools only after test cuts determine no damage to masonry units will result.

D. Do not damage masonry units.

E. When cutting is complete, remove dust and loose material by brushing.

F. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch (6 mm) layers. Form a smooth, compact concave joint to match existing.

G. Allow layer to become "thumbprint hard" before applying next layer.

H. Pack final layer flush with surfaces of masonry units. When mortar becomes "thumbprint hard", tool joints.

I. Moist cure for 72 hours.

3.05 COPING STONE

A. Coping should be thoroughly drenched with clear, potable water and then set in a full bed of mortar with the bed joint raked back 1/2” for gun-in of non-staining sealant.

B. Head joints (adjacent rising walls) are left open to receive properly placed backer rod, primer and a non-staining sealant. The backer rod should be placed parallel to the wash of the coping

C. Bridge coping over control joints to maximize their effectiveness and use an elastic joint as shown. All coping should have a minimum 1/2” wash to control water runoff.

3.06 CLEANING

A. Remove mortar droppings and other foreign substances from wall surfaces.

B. First wet surfaces with clean water, then wash down with a solution of soapless detergent specially prepared for cleaning brick.

C. Brush with stiff fiber brushes while washing, and immediately thereafter hose down with clean water.

D. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.

E. Remove excess mortar, smears, and droppings as work proceeds and upon completion.

F. Use of muriatic acid for cleaning is prohibited.

G. Clean surrounding surfaces.

END OF SECTION 04 0100

SECTION 04 2000
UNIT MASONRY - ENGINE 5

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Common brick.

C. Mortar and grout.

D. Reinforcement and anchorage.

E. Flashings.

F. Lintels.

G. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 04 0100 - Maintenance of Masonry - Engine 5.

B. Section 06 1000 - Rough Carpentry - Engine 4, 5, 8, 20 & 24: Nailing strips built into masonry.

C. Section 07 6200 - Sheet Metal Flashing and Trim - Engine 4, 5, 8, 20 &24: Through-wall masonry flashings.

D. Section 07 9200 - Joint Sealants - Engine 4, 5, 8, 20 & 24: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

C. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale) 2017.

D. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2016a.

E. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.

F. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units 2021.

G. ASTM C150/C150M - Standard Specification for Portland Cement 2021.

H. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019.

I. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.

J. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.

K. BIA Technical Notes No. 46 - Maintenance of Brick Masonry 2017.

L. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

M. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.

1.06 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
   1. Maintain one copy of each document on project site.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches (400 by 200 mm) and nominal depths as indicated on drawings for specific locations.
   2. Load-Bearing Units: ASTM C90, normal weight.
      a. Manufacturers:
         1) The Concrete Products Group; Spec-Brik: www.concreteproductsgroup.com/#sle.
         2) Substitutions: See Section 01 6000 - Product Requirements.

2.02 BRICK UNITS

A. Manufacturers:
   1. Belden Brick; [_____]: www.beldenbrick.com/#sle.
   2. Endicott Clay Products Co; [_____]: www.endicott.com/#sle.
   3. Substitutions: See section 01 6000 - Product Requirements.

B. Building (Common) Brick: ASTM C62, Grade SW; solid units.
   1. Nominal size: As indicated on drawings.

2.03 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M, Type N.

B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.

2.04 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
   1. Blok-Lok Limited; [_____]: www.blok-lok.com/#sle.
   2. Hohmann & Barnard, Inc; X-Seal Anchor: www.h-b.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
   1. Anchor plates: Not less than 0.075 inch (1.91 mm) thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch (4.75 mm) thick.
   3. Vertical adjustment: Not less than 3-1/2 inches (89 mm).

2.05 FLASHINGS

A. Metal Flashing Materials:
   1. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gauge, 0.0187 inch (0.48 mm) thick; finish 2B to 2D.

B. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc; [_____]: www.h-b.com/#sle.
      b. Mortar Net Solutions; Metal Drip Edges: www.mortarnet.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORIES

A. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Full-Height Airspace Maintenance and Drainage Material: Mesh panels fitted between masonry ties.
      a. Drainage Material Thickness: 3/8 inch (9.5 mm).
      b. Manufacturers:
         1) Advanced Building Products, Inc; Mortairvent-CW: www.advancedbuildingproducts.com/#sle.
         2) CavClear/Archovations, Inc; CavClear Masonry Mat: www.cavclear.com/#sle.
         3) Substitutions: See Section 01 6000 - Product Requirements.

B. Weeps:
   1. Type: Polyester mesh.
   2. Color(s): As selected by Designer from manufacturer's full range.
   3. Manufacturers:
      a. Advanced Building Products, Inc; [_____]: www.advancedbuildingproducts.com/#sle.
      b. Blok-Lok Limited; [_____]: www.blok-lok.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.07 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Exterior, loadbearing masonry: Type N.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:

1. Bond: Running.
2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
3. Mortar Joints: match existing.

D. Brick Units:
1. Bond: Running.
2. Coursing: Three units and three mortar joints to equal 8 inches (200 mm).
3. Mortar Joints: match existing.

3.04 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches (600 mm) on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

3.05 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions.

3.06 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up flashing ends at least 1 inch (25.4 mm), minimum, to form watertight pan at non-masonry construction.

B. Terminate flashing up 8 inches (203 mm) minimum on vertical surface of backing:
1. Terminate vertical leg of flashing into bed joint in masonry or reglet in concrete.

C. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.

D. Extend metal flashings to within 1/2 inch (12 mm) of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.

E. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with flashing sealant/adhesive.

END OF SECTION 04 2000

SECTION 06 1000
ROUGH CARPENTRY - ENGINE 4, 5, 8, 20 & 24

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood blocking as related to modifications or alterations to existing roof-mounted curbs.

B. Perimeter flat roof wood nailers to be added to the height of the tapered insulation.

C. Preservative treated wood materials as specified.

D. Communications and electrical room mounting boards.

E. Concealed wood blocking, nailers, and supports.

F. Refastening existing wood nailers and/or plywood in accordance with the specified standards, where existing nailers and/or plywood are suitable for reuse.

1.02 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing and Trim - Engine 4, 5, 8, 20 &24: Step Flashing, Counterflashing, Valleys, etc....

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing 2017.

C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2021.

D. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.

F. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. PS 1 - Structural Plywood 2009 (Revised 2019).

H. PS 20 - American Softwood Lumber Standard 2020.

I. SPIB (GR) - Grading Rules 2014.

J. All fasteners for wood decking to meet FM 4470

1.04 SUBMITTALS

A. Product Data: Provide technical data on wood preservative materials and application instructions.

B. Lumber certifications provided by lumber supplier identifying specification conformity.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Wood blocking Supplier
   1. Installer Qualification: Use accredited contractor, certified installers, and evaluated materials. All new materials shall match existing in size, like and kind.
   2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in roof deck distribution. Use secondary materials approved in writing by primary material manufacturer.

B. Standards:

1. Comply with all pertinent standards specified in the contract documents, including those listed below. If the building code references a specific edition or revision of an individual standard, then comply with that edition or revision. Otherwise comply with the latest published edition or revision available on the date the Contractor submits its price proposal to the Owner.
    a. Manufacturer's published specifications, product data sheets, application instructions, and technical bulletins.

C. Qualifications of Installers:
1. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this section.
2. In acceptance or rejection of the work of this section, the Owner will make no allowance for lack of skill on the part of the workers.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.07 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

B. Provide five year workmanship warranty for all new wood blocking.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
3. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, and recommended by manufacturer for intended fit, S4S.

C. Moisture Content: S-dry or MC19.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.

E. Plywood
1. 5/8" minimum Exterior Grade, Exposure 1 Plywood, CDD Grade or better, one side sanded for smooth application of new roof flashing.

2.03 EXPOSED DIMENSION LUMBER

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

B. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

C. Sizes: Nominal sizes as indicated on drawings.

D. Surfacing: S4S.

E. Moisture Content: S-dry or MC19.

F. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 (50 by 150 through 100 by 400 mm)):
   1. Species: Douglas Fir.
   2. Grade: Select Structural.

2.04 EXPOSED BOARDS

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

B. Moisture Content: Kiln-dry (15 percent maximum).

C. Surfacing: S4S.

D. Species: Douglas Fir.

E. Grade: No. 2, 2 Common, or Construction.

2.05 CONSTRUCTION PANELS

A. Roof Sheathing, PS 1, Structural Plywood: Any type, rated Structural I Sheathing.
   1. Bond Classification: Exterior.
   2. Span Rating: 48/24.
   3. Performance Category: 3/4 PERF CAT.
   4. Exterior Grade, Exposure 1 Plywood, CDD Grade or better

B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

C. Other Applications:
   1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
   2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
   3. Roof Sheathing: All plywood roof sheathing is to be minimum 5/8", APA Rated Exterior, Structural 1. Only waterproof glue (CDD) is acceptable.
   4. Other Locations: 1, CDD Plugged or better.
   5. Exposure Time: Sheathing undamaged and integral roofing underlayment layer intact after exposure to weather for up to 180 days.

2.06 ACCESSORIES

A. Fasteners and Anchors:
   1. Slate Specific Stainless steel nails shall be annular ring or screw shank, minimum 3/8 inch diameter head, of sufficient length to penetrate through sheathing or 1/2 inch maximum into solid decking.
   2. Metal and Finish: Stainless steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   3. All rough carpentry fasteners must be carbon steel with corrosion-resistant coating. Fasteners shall meet FM 4470
   4. Masonry/Concrete Fasteners
      a. Corrosion-resistant, threaded fastener with low profile head.
      b. Fasteners shall be a minimum of 3/16" diameter with a 1" minimum embedment.
      c. Fastener to be FM Global approved.
      d. Approved Products
         1) Tapcon Flat-Head Phillips with Blue Climaseal or White UltraShield by ITW Buildex
         2) Tapper Flat-Head Phillips with Perma-Seal Coating by Powers Fasteners, Inc.

5. Steel / Wood Fasteners
    a. Corrosion-resistant, self-tapping, self-drilling screw with low profile head.
    b. Fastener to be FM Global approved.
    c. Approved Products
        1) Roof Grip by OMG with Climaseal Coating
        2) Dekfast by SFS intec, Inc., with Sentri Coating
        3) Standard roofing fastener by OMG, with CR-10 coating
    d. Fasteners to be #12 minimum and of sufficient length to penetrate into steel 3/4" and wood 1".
6. Insulation Plates (washers
    a. Round, carbon steel, ASTM F 844-072, galvanized per ASTM F 2674. Minimum diameter 2 5/8".

B. Water-Resistive Barrier: As specified in Section 07 2500.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. Discard units of material with defects that might impair quality of work and units that are too small to use in fabricating work with minimum joints or optimum joint arrangement.

C. Set nailers to required levels and lines with members plumb and true.

D. All perimeter nailers shall be of uniform height within a given roof section.

E. Nailers shall be installed with 1/4" gap between ends of adjoining pieces.

F. Nailers shall be fastened in accordance with the following schedule
    1. Fasteners in 6" or wider (nominal) lumber shall be installed in two (2) rows, staggered one-third of nailer width. Listed spacings indicate distance between fasteners in adjacent rows.
    2. Two (2) fasteners shall be installed within 6" of each nailer end
    3. Corner fastener spacing shall extend 8' from all outside building corners
    4. Where two or more nailers are installed, each nailer shall be fastened independently
    5. Over all deck types, the bottom nailer shall be fastened using the specified fasteners and 5/8" diameter washers. Countersink washers and fasteners level with top of wood using spade bit or similar method. Fasten subsequent nailers, where specified, using the specified screws without washers.

3.04 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. All nailers shall be #2 or better, construction grade lumber.

C. Inspect and repair all wood curbs at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

D. Plywood joints must be true and well fitting, allowing for expansion and contraction. Allow 1/8" at end and edge joints.

E. Plywood fasteners shall be installed in a uniform grid pattern, with a maximum spacing of 18" o.c. between adjacent fasteners

3.05 TOLERANCES

A. Framing Members: 1/4 inch (6 mm) from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.06 CLEANING

A. Waste Disposal:
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Prevent sawdust and wood shavings from entering the storm drainage system.

C. When sawing of wood or plywood is performed on the rooftop, contain and/or clean sawdust in such a way as to prevent contamination of substrate to receive subsequent construction materials

END OF SECTION 06 1000

SECTION 07 0150.19
PREPARATION FOR RE-ROOFING - ENGINE 4, 5, 8, 20 & 24

PART 1 GENERAL

1.01 SECTION INCLUDES

Engine 4:

A. Clean, prep and prepare existing roof surface in preparation for roof replacement at Roof Area A, B, C, and D.

B. Preparation of existing concrete roof deck in preparation for roof replacement system in designated areas as indicated on drawings at Roof Area A, B, C, and D.

C. Removal of existing flashing and counterflashings.

D. Temporary roofing protection.

E. Installation of new wood nailers to accommodate the new tapered roof insulation heights.

F. Roof drain testing and replacement.

Engine 5:

G. Clean, prep and prepare existing roof surface in preparation for roof replacement at Roof Area A and B.

H. Removal of existing flashing and counterflashings.

I. Temporary roofing protection.

J. Installation of new wood nailers to accommodate the new tapered roof insulation heights.

K. Roof drain testing and replacement.

Engine 8:

L. Clean, prep and prepare existing roof surface in preparation for roof recover at Roof Area A.

M. Removal of existing flashing and counterflashings.

N. Installation of new wood nailers to accommodate the new tapered roof insulation heights.

O. Roof drain testing and replacement.

Engine 20:

P. Preparation of existing concrete roof deck in preparation for roof coating system in designated areas as indicated on drawings at Roof Area D.

Q. Clean, prep and prepare existing roof surface in preparation for roof repairs at Roof Areas B and C.

R. Removal of existing flashing and counterflashings.

S. Installation of new wood nailers to accommodate the new tapered roof insulation heights.

T. Roof drain testing and replacement.

Engine 24:

U. Preparation of existing concrete roof deck in preparation for roof coating system in designated areas as indicated on drawings at Roof Area A, C, D & F.

V. Clean, prep and prepare existing roof surface in preparation for roof repairs at Roof Areas B and E.

W. Removal of existing flashing and counterflashings.

X. Installation of new wood nailers to accommodate the new tapered roof insulation heights.

Y. Roof drain testing and replacement.

1.02 RELATED REQUIREMENTS

A. Section 02 41 19 - Selective Structure Demolition

B. Section 06 10 10 - Miscellaneous Rough Carpentry:

C. Section 07 1800 - Traffic Coatings

D. Section 07 2113 - Clay Roof Tiles

E. Section 07 4113 - Metal Roof Panels

F. Section 07-5419 - Polyvinyl Chloride Roofing

G. Section 07 6200 - SHEET METAL FLASHING AND TRIM: Replacement of flashing and counterflashings.

H. Section 06 10 10 - Miscellaneous Rough Carpentry:

I. Section 07 5423 - Thermoplastic Polyolefin TPO Roofing

J. Section 07 6200 - Sheet Metal Flashing and Trim - Engine 4, 5, 8, 20 &24: Replacement of flashing and counterflashings.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with affected subcontracted mechanical and electrical work associated with roof penetrations. Communicate with Owner's Representative to identify all equipment that is to be removed from the roof as abandoned or non-working.

B. Pre-installation Meeting: Convene one week before starting work of this section.

C. Provide site management (Building Engineer, Principal, Asst Principal, DCPS Representative, DGS Representative and Designer) with weekly updates of areas scheduled for work (using plan maps and bar chart schedules) including dates and hours, and access areas impacted by scaffolding or man-lifts.

D. Provide Design Consultant with drain inspection certification / report after pre-construction water test for acceptable drainage flow.

E. Schedule work to coincide with commencement of installation of new roofing system.

1.04 FIELD CONDITIONS

A. Contractor is responsible for ALL leak responses from the date of Notice to Proceed until the completion of the project. Contractor must respond within 24 hours for all reported non-emergency leaks. Contractor must commit to respond within 4 hours for all reported emergency leaks.

B. Do not remove existing roofing membrane when weather conditions threaten the integrity of the building contents, operations or intended continued occupancy.

C. Remove no more roofing than can be made watertight within the same work day.

D. Maintain continuous temporary protection prior to and during installation of new roofing system.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Photo catalogue and document existing pre-construction conditions in the areas below and adjacent the contracted improvements, including stained finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before any Work begins.

B. Verify that existing roof surface is clear and ready for work in the scheduled section.

C. Verify all roof drains to be free and clear to remove water from the roof.

D. Verify the condition of all roof top equipment. Document if the equipment is in good working condition.

3.02 PREPARATION

Engine 4 & 5:

A. Provide adhesion testing prior to full tear-off beginning. Sample test areas are defined by ASTM E907 and FM 1-52 which require a minimum of two tests per roof area. For roof areas of 50 squares to 100 squares, ASTM E907 requires four tests. For roof areas larger than 100 squares, ASTM E907 requires and FM 1-52 recommends an additional test for each additional 100 squares of roof area or portion.

B. Provide fastener pull out testing prior to full tear-off beginning. Sample test areas are defined by ANSI/SPRI FX-1 2016.

C. Water test all roof drains and document status with the estimated quantity of water applied to the drain piping, and how long for part (1) one and the length of test for the head pressure above the piping connection for part (2) two. A similar test will be required for the new drains assembly after the roof is completed.

D. Sweep roof surface and roof deck clean of loose matter prior to installation of new roof system.

E. Remove all loose debris, and refuse into an acceptable container and dispose offsite.

F. Provide removable screened fencing around any temporary stationed containers, scaffolding or storage areas. The fencing should be sufficient in height to deter access by pedestrians, faculty or children beyond the outlined perimeter.

Engine 8:

G. Provide pull test and insulation uplift testing prior to full tear-off begins. Sample test areas are defined by ASTM E907 and FM 1-52 which require a minimum of two tests per roof area. For roof areas of 50 squares to 100 squares, ASTM E907 requires four tests. For roof areas larger than 100 squares, ASTM E907 requires and FM 1-52 recommends an additional test for each additional 100 squares of roof area or portion

H. Water test all roof drains and document status with the estimated quantity of water applied to the drain piping, and how long for part (1) one and the length of test for the head pressure above the piping connection for part (2) two. A similar test will be required for the new drains assembly after the roof is completed.

I. Sweep roof surface and roof deck clean of loose matter prior to installation of new roof system.

J. Remove all loose debris, and refuse into an acceptable container and dispose offsite.

K. Provide removable screened fencing around any temporary stationed containers, scaffolding or storage areas. The fencing should be sufficient in height to deter access by pedestrians, faculty or children beyond the outlined perimeter.

Engine 20:

L. Provide adhesion testing for roof coating prior to application of work in accordance with ASTM D 4541.

M. Water test all roof drains and document status with the estimated quantity of water applied to the drain piping, and how long for part (1) one and the length of test for the head pressure above the piping connection for part (2) two. A similar test will be required for the new drains assembly after the roof is completed.

N. Sweep roof surface and roof deck clean of loose matter prior to installation of new roof system.

O. Remove all loose debris, and refuse into an acceptable container and dispose offsite.

P. Provide removable screened fencing around any temporary stationed containers, scaffolding or storage areas. The fencing should be sufficient in height to deter access by pedestrians, faculty or children beyond the outlined perimeter.

Engine 24:

Q. Provide adhesion testing prior to full tear-off beginning. Sample test areas are defined by ASTM E907 and FM 1-52 which require a minimum of two tests per roof area. For roof areas of 50

squares to 100 squares, ASTM E907 requires four tests. For roof areas larger than 100 squares, ASTM E907 requires and FM 1-52 recommends an additional test for each additional 100 squares of roof area or portion.

R. Provide fastener pull out testing prior to full tear-off beginning. Sample test areas are defined by ANSI/SPRI FX-1 2016.

S. Water test all roof drains and document status with the estimated quantity of water applied to the drain piping, and how long for part (1) one and the length of test for the head pressure above the piping connection for part (2) two. A similar test will be required for the new drains assembly after the roof is completed.

T. Sweep roof surface and roof deck clean of loose matter prior to installation of new roof system.

U. Remove all loose debris, and refuse into an acceptable container and dispose offsite.

V. Provide removable screened fencing around any temporary stationed containers, scaffolding or storage areas. The fencing should be sufficient in height to deter access by pedestrians, faculty or children beyond the outlined perimeter.

3.03 MATERIAL REMOVAL: REFER TO SUMMARY SCOPE OF WORK AND CONTRACT DRAWINGS FOR MORE INFO AND MATERIAL LOCATIONS.

Engine 4, 5 & 8:

A. Remove only the existing roofing (in quantity) materials that can be replaced and installed with new materials the same day.

B. Remove metal counter flashings. Do not cut or damage the "keyed" receiver metal secured in the wall construction.

C. Remove all roof drains and replace with new assemblies the same day. All new drains must be secured and made watertight the same day. No temporary drain plugs will be approved, unless approval is received prior to the requested work.

D. Remove all wood blocking used as a field pipe support in preparation of a new pre-manufactured unit. Provide temporary blocking as necessary.

E. Scrape roofing gravel from membrane surface without causing serious damage to membrane felts.

F. Cut and lay flat any membrane blisters.

Engine 20:

G. Remove only the existing roofing (in quantity) materials that can be replaced and installed with new materials the same day.

H. Remove metal counter flashings. Do not cut or damage the "keyed" receiver metal secured in the wall construction.

I. Remove all roof drains and replace with new assemblies the same day. All new drains must be secured and made watertight the same day. No temporary drain plugs will be approved, unless approval is received prior to the requested work.

J. Remove all wood blocking used as a field pipe support in preparation of a new pre-manufactured unit. Provide temporary blocking as necessary.

K. Repair existing concrete deck surface to provide smooth working surface for new roof system. All repairs must be completed to a sound surface in accordance with Section 03 01 00 MAINTENANCE OF CONCRETE

L. Remove deteriorated sealant from standing seam metal roof panels, clean joint and recaulk.

M. Remove defective boot and install new Dektite flashing boot for positive seal. (1 ea.)

N. Replace Deteriorated rivets on Area C with new Stainless Steel Rivets. (allowance of 1000 ea.)

Engine 24:

O. Remove insulation and fasteners, cant strips, blocking.

P. Remove only the existing roofing (in quantity) materials that can be replaced and installed with new materials the same day.

Q. Remove metal counter flashings. Do not cut or damage the "keyed" receiver metal secured in the wall construction.

R. Remove all roof drains and replace with new assemblies the same day. All new drains must be secured and made watertight the same day. No temporary drain plugs will be approved, unless approval is received prior to the requested work.

S. Remove all wood blocking used as a field pipe support in preparation of a new pre-manufactured unit. Provide temporary blocking as necessary.

T. Remove existing roofing membrane, perimeter base flashings, roof curb base flashings around roof protrusions, associated sheet metal flashings, pitch pans and pockets.

U. Remove insulation and fasteners, cant strips, blocking.

V. Remove vapor retarder, if present.

W. Repair existing concrete deck surface to provide smooth working surface for new roof system. All repairs must be completed to a sound surface in accordance with Section 03 01 00 MAINTENANCE OF CONCRETE

X. Remove deteriorated sealant from joint, clean joint and recaulk.

Y. Repair damaged gutters/downspouts, seal joints, and replace fasteners as needed.

3.04 INSTALLATION

A. Coordinate scope of this work with requirements for installation of new roofing system, see Section for TPO roof recover system for additional requirements.

3.05 FIELD QUALITY CONTROL

A. Contractor shall verify that:
   1. The substrate is smooth, dry, and suitable for installation in accordance with the manufacturers specifications for the Special Project Warranty prior to installing the roof system.
   2. Existing roof drain body must be tested and certified to be clear prior to commencement of any roof demolition. The testing must be photo documented and reported to the Owner's Representative, and Designer for approval to move forward with the new roof assembly. Any drains identified to be clogged must be cleared or modified to commence roofing in that section.
   3. New Roof drain body assembly components must be installed and made watertight in accordance with Section 22 14 26 Roof Drains.
   4. All projections and penetrations within the roof system less than eight (8) inches in height are to be modified and raised to a height of eight (8) inches, minimum, above the finished height of the roof system.
      a. Plumbing vent piping shall be raised using no-hub connectors and schedule 40 plastic piping to a height of not less than eight (8) inches and not more than twelve (12) inches above the finished height of the roof system.
   5. Items not specified to be removed and replaced, but necessary for proper installation of the Work are included in this specification as the responsibility of the Contractor and cannot be proposed as a hidden condition or non-reported detail upon signing of the project contract. All required modifications to the existing roof penetrations, as defined above, must be properly coordinated for removal and replacement.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.06 PROTECTION

A. Provide protection of existing roofing system that is not having work performed on it.

B. Provide adequate protection for any grounds that will be traveled by trucks, or heavy equipment that might damage the grass, shrubs, trees or other green growth that has been identified as protected by DGS.

C. Provide for sufficient surface drainage from sheeting to existing drainage openings, grates or roof drains.

D. Do not permit traffic over newly installed roof system(s) without proper protection.

E. Do not permit traffic over unprotected or repaired concrete deck surfaces.

3.07 SCHEDULES

A. Provide bar chart schedules and colored roof plan maps of all areas, to be completed and dispersed weekly.

B. Identify areas that have been completed with a percentage complete.

C. Provide a brief description of the progress for the scheduled weekly meetings.

D. DGS in coordination with the Designer will coordinate and schedule the weekly meetings to include DGS, Contractor Project Manager, Facility Manager, Lead Engineer, and the Designer.

END OF SECTION 07 0150.19

SECTION 07 1500
VAPOR RETARDER MEMBRANE - ENGINE 4, 5 & 24

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes products and installation requirements for a one-ply SBS bituminous membrane to serve as a vapor retarder in the roof system.

B. Related Sections:
   1. Section 030100 – Maintenance of Concrete.
   2. Section 06100 – Rough Carpentry.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. D41-94(2000)e1 Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
   2. D312-00 Standard Specification for Asphalt Used in Roofing.
   3. D2178-97a Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
   4. D4586-00 Standard Specification for Asphalt Roof Cement, Asbestos-Free.
   5. D4601-98 Standard Specification for Asphalt-Coated Glass-Fiber Base Sheet Used in Roofing.
   6. ASTM D 5849 - Standard Test Method for Evaluating Resistance of Modified Bituminous Roofing Membrane to Cyclic Fatigue (Joint Displacement)
   7. ASTM D 6162 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
   8. ASTM D 6163 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
   9. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
   10. ASTM D 6298 - Standard Specification for Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Bituminous Sheets with a Factory Applied Metal Surface.
   11. ASTM D 7379 - Standard Test Methods for Strength of Modified Bitumen Sheet Material Laps Using Cold Process Adhesive.
   12. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings.
   13. F1667-02 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

1.03 QUALITY ASSURANCE

A. All work to be performed in accordance with the manufacturer's published specifications. Advise Consultant of any discrepancies prior to commencement of work.

B. Take care to avoid contamination of the new membrane with debris from tear-off operations. Avoid all traffic over new membrane until bitumen has cooled.

C. Contractor shall ensure that the vapor retarder membrane is properly sealed at all perimeters and projections after installation and shall correct all defects and/or damage to the membrane before proceeding with roof system installation.

1.04 SEQUENCING

A. Perform work in a sequential manner to avoid construction traffic over completed areas as operations progress.

1.05 WIND UPLIFT RESISTANCE:

A. Performance testing shall be in accordance with ANSI/FM 4474, FM 4450, FM 4470, UL 580 or UL 1897.

1.06 FIRE CLASSIFICATION:

A. Performance testing shall be in accordance with UL 790, ASTM E108, FM 4450 or FM 4470 to meet the 4:12 roof slope requirement.
   1. Meets requirements of UL Class A or FM Class A.

B. Performance testing shall be in accordance with UL 1256, FM 4450 or FM 4470 to meet the specified requirements for interior flame spread and fuel contribution.
   1. Meets requirements of UL 1256, or FM Class 1.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Where possible, Contractor shall utilize the same manufacturer for both the vapor retarder membrane and the roof membrane meeting the following product requirements:

2.02 MATERIALS AND COMPONENTS

A. SBS-modified bitumen self-adhered membrane with release film on the bottom surface and a tri-laminate woven polyethylene film top surface reinforcement.
   1. Thickness: 31.5 mils (0.80 mm)
   2. Width: 45 in (1.14 m)
   3. Length: 133 ft (40.8 m)
   4. Meets or exceeds ASTM D2178 “Standard Test Method for Air Permeance of Building Materials.”
   5. Meets or exceeds ASTM E96 (Procedure B) “Standard Test method for Water Vapor Transmission of Materials.”

B. Miscellaneous:
   1. Asphalt mastic: Shall conform to ASTM D4586, Type I.
   2. Plastic roof cement: Shall conform to ASTM D4586, Type I.
   3. Asphalt primer: Shall conform to ASTM D41.
   4. PMMA or PU resin based mastic - ASTM 412, D1653

C. Fasteners for attaching roofing plies to wood blocking: Shall comply with ASTM F1667; type as required by item anchored and substrate.
   1. Zinc-coated steel roofing nails with 3/8-inch head diameter.

D. Approved Manufacturer's
   1. GAF Building Materials Corporation, Wayne, NJ.
   2. Johns-Manville Corporation, Denver, CO.
   3. Sika Sarnafil Corporation, Canton MA
   4. Soprema Corporation
   5. Seaman Corporation

PART 3 - EXECUTION

3.01 EXAMINATION FOR ALL SECTIONS

A. Contractor shall verify that:
   1. The substrate is sound, smooth and dry prior to installing the vapor retarder membrane.
   2. Existing projections such as pipes and curbs are properly anchored, secure and acceptable prior to installing the vapor retarder membrane.

B. Do not proceed until unsatisfactory conditions, including moisture, have been corrected.

3.02 PREPARATION

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

B. Repair any defective or damaged steel and/or concrete roof deck sections prior to installation of new roof system.

C. Prevent materials from entering and clogging roof drains and flashings 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.

3.03 PREPARATION FOR CONCRETE DECK:

A. Inspect and repair roof decking as required prior to commencing the work of this section.

B. Remove unused projections and close off openings as shown in the Contract Drawings.

C. Sweep the substrate to broom-clean condition to remove all dust, dirt and debris.

D. Prime the entire substrate with asphalt primer applied at the rate of one (1) gallon per 150 square feet of surface.

E. Seal cracks at perimeters and projections with plastic roof cement or manufacturer's approved material to prevent bituminous materials from entering the building.

3.04 INSTALLATION

A. Prime concrete substrate with manufacturers' approved primer. Allow primer to dry to tack.

B. Start membrane installation at the lowest point of the roof; install plies in a uniform and continuous surface thickness of primer coverage.

C. Peel away backing and adhere to concrete substrate, side and end lap each sheet a minimum of 3 inches and 6 inches, respectively. Stagger each sheet at least 12 inches Hot Air Weld laps. Laps must have a minimum ½ inch bleed out.

D. Apply Colply Adhesive and/or approved liquid applied membrane to seal all roof penetrations, corners, detail flashing and temporary seals that may require over-night protection.

E. Continue installing full-width plies of vapor barrier, lapping in accordance with the manufacturer's specifications; side and end lap each sheet a minimum of 3 inches and 6 inches, respectively.

F. Termination at roof perimeters and projections:

1. At walls, curbs and other vertical surfaces, turn up vapor barrier a minimum of four (4) inches. Seal top edge of vapor barrier with approved VB mastic or approved liquid applied membrane.
2. Apply Colply Adhesive and/or approved liquid applied membrane to seal all roof penetrations, corners, detail flashing and temporary seals that may require over-night protection.
3. All areas to receive vapor barrier are required to be made watertight daily. Remove only an area or existing roofing that can be covered in the same work day.
4. Water test all roof drains after vapor barrier is applied to check for sound connections and a watertight application.

END OF SECTION 07150

SECTION 07 1800
TRAFFIC COATINGS - ENGINE 20

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Coating for waterproofing and traffic surface of concrete roof deck.

1.02 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016, with Editorial Revision (2021).

B. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds 1998 (Reapproved 2017).

C. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser 2019.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

F. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings 2020a.

G. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2020.

H. ICC-ES AC39 - Acceptance Criteria for Walking Decks 2017.

I. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements for submittal procedures.

B. Product Data: Include product characteristics and limitations. Identify dissolving solvents, fuels, and potential destructive compounds.

C. Manufacturer's Installation Instructions: Include special field conditions required to install traffic membrane and potential incompatibilities with adjacent materials.

D. Maintenance Data: Include procedures for stain removal, repairing surface, and cleaning.

E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing installation of traffic membrane, with minimum 5 years documented experience and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Maintain storage area at minimum ambient temperature of 55 degrees F (13 degrees C).

B. Keep away from fire or open flame.

1.06 FIELD CONDITIONS

A. Do not install materials when temperature is below 50 degrees F (10 degrees C) or above 90 degrees F (32 degrees C).

B. Maintain this temperature range, 24 hours before, during and 72 hours after application.

C. Restrict traffic from area where materials are being installed or are curing.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide 10 year NDL manufacturer warranty.
   1. Include coverage for delamination of system from substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Polyurethane Traffic Coating:
   1. Neogard Division of Jones-Blair Company; www.neogard.com/#sle.
   2. Pecora Corporation; Pecora-Deck 800 Deck Coating System with P-801-VOC Concrete and Interlaminary Primer, 802 Base Coat, 804 Intermediate Coat, and 806 Top Coat: www.pecora.com/#sle.
   3. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

2.02 TRAFFIC COATINGS

A. Pedestrian Polyurethane Waterproof Coating System: Fluid applied polyurethane system with base and top coat.
   1. Finished Coating Thickness: 48 mils, 0.048 inch (1.21 mm), minimum.
   2. Color: Gray.
   3. Manufacturers:
      a. Tremco Commercial Sealants & Waterproofing; Vulkem 350NF/351: www.tremcosealants.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 MATERIALS

A. Membrane: Fluid applied polyurethane; waterproof; color as selected by Architect; comply with following:
   1. Tensile Strength (ASTM D412
   2. Water Vapor Permeance (ASTM E96/E96M):
   3. Surface Burning Characteristics (ASTM E84):
   4. Adhesive Bond Peel Strength (ASTM D903):
   5. Abrasion Resistance (ASTM D4060): Maximum Weight loss of gm/1000 cycles.

B. Surfacing: Clean sand.

C. Filler and Primer: As recommended by membrane manufacturer.

D. Cant Strips: 1 inch by 1 inch (25.4 mm by 25.4 mm) by 45 degrees, of dense sponge rubber compatible with adjacent materials.

E. Sealant: As recommended by membrane manufacturer, and compatible with system and adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate is ready to receive work, surface is clean, dry and free of substances that could adversely affect bond.

3.02 PREPARATION

A. Clean substrate surface free of foreign matter.

B. Patch concrete substrate with filler to produce surface conducive to bond.

C. Install cant strips securely at intersecting surfaces.

D. Protect adjacent surfaces.

3.03 INSTALLATION

A. Apply system materials in accordance with manufacturer's instructions.

B. When primer is tack free, apply one base coat of membrane to a total minimum dry film thickness as required by the manufacturer.

C. When base coat is tack free, apply one coat of top coating to a minimum dry film thickness as required by the manufacturer.

D. Extend primer, base and top coats up intersecting and perimeter vertical surfaces, 4 inches. Terminate top edge in a straight line.

E. Finish to smooth surface sloped to drains. Cove at vertical surfaces.

F. Apply surfacing to top coat before set.

G. Apply sealant to junction of horizontal and intersecting surfaces to achieve watertight seal.

3.04 PROTECTION

A. Do not permit traffic over unprotected surfaces.

END OF SECTION 07 1800

SECTION 07 3213
CLAY ROOF TILES - ENGINE 20 & 24

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Repair and replacement of damaged, broken and/or missing clay roof tiles.

B. Underlayment, including ice dam protection, as needed to provide watertight repairs.

C. Wood attachment members (battens, nailers, etc.), as needed to provide suitable attachment substrates.

D. Metal roof flashing and counterflashing, as needed to restore performance of flashing systems.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Material requirements for attachment members (battens, nailers, etc.).

B. Section 07 6200 - SHEET METAL FLASHING AND TRIM: Roof flashing.

1.03 REFERENCE STANDARDS

A. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction 2012 (Reapproved 2019).

B. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.

C. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar 2018.

D. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019.

E. ASTM C1167 - Standard Specification for Clay Roof Tiles 2011 (Reapproved 2017).

F. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2020.

G. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free 2007 (Reapproved 2018).

H. NRCA (RM) - The NRCA Roofing Manual 2019.

I. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.04 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements, for submittal procedures.

B. Shop Drawings: Submit for metal flashings and counterflashings, indicate overall configurations and thicknesses, details at complex intersections, jointing methods and locations, and fastening details.

C. Selection Samples: Submit color chips representing manufacturer's full range of available tile colors and finishes.

D. Manufacturer’s Certificates: Certify that tiles supplied for the project meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store materials in manufacturer's unopened packaging, with labels intact, until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Clay Roofing Tile Manufacturers:
   1. Gladding, McBean: www.gladdingmcbean.com/#sle.

2. Ludowici Roof Tile: www.ludowici.com/#sle.
3. MCA Tile: www.mca-tile.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROOF TILES

A. Existing Clay Roof Tiles: Salvage and reuse intact and serviceable existing clay tiles wherever possible. Replace damaged/broken tiles in kind with existing sizes and profiles.

B. Clay Roof Tiles:
1. Match existing tile as closely as possible.
2. Comply with requirements of ASTM C1167, Grade 1 tile; with nail holes made before firing.
3. Profile: One-piece S-shaped barrel tile.
4. Tile Size: As selected from manufacturer's standards.
5. Finish: Unglazed, natural fired.

2.03 SHEET MATERIALS

A. Underlayment: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; minimum thickness of 40 mils, 0.040 inch (1 mm); with strippable release paper and slip-resistant embossed polyethylene sheet top surface.

2.04 METAL FLASHING MATERIALS

A. Provide metal roof flashing as specified in Section 07 6200.

B. Provide metal roof flashings as indicated and as required for watertight roofing system, including eave edge, gable edge, ridge vent, and open valley flashing.
1. Form flashings to profiles indicated, or as required to shed water and protect building from water damage.
2. Form sections square, flat, and accurate to profile, in maximum possible lengths, free from distortion or other defects detrimental to function or appearance.
3. Hem exposed edges of flashings minimum 1/4 inch (6 mm) on underside.
4. Coat concealed surfaces of flashings with bituminous paint.

C. Copper Flashing: ASTM B370, cold rolled 16 oz/sq ft, 24 gauge, 0.0216 inch (0.55 mm) minimum copper thickness; natural finish.

D. Bituminous Paint: Asphaltic mastic, ASTM D4479/D4479M, Type I.

2.05 FASTENERS

A. Underlayment Fasteners: Hot-dip galvanized steel roofing nails, 11 gauge, 0.12 inch (3.05 mm) diameter, sharp pointed with barbed shanks, minimum 3/8 inch (9.5 mm) diameter head, and of length sufficient to penetrate 3/4 inch (19 mm) into solid substrate or completely through sheathing.

B. Tile Fasteners: Provide copper ring shank nails, 10 gauge, 0.134 inch (3.40 mm) diameter, with minimum 7/16 inch (11 mm) diameter head, of sufficient length to penetrate 3/4 inch (19 mm) into solid substrate or completely through sheathing.

C. Tile Fasteners: Stainless steel ring shank nails, 10 gauge, 0.134 inch (3.40 mm) diameter, with minimum 3/8 inch (9.5 mm) diameter head, of sufficient length to penetrate 3/4 inch (19 mm) into solid substrate or completely through sheathing.

2.06 ACCESSORIES

A. Attachment Members:
1. Battens: 1 inch by 2 inch (25.4 mm by 51 mm), nominal, spaced as required for tile size.
2. Nailers: Nominal 2 inch (50 mm) thick members, height as required for specific conditions.

B. Snow Guards: As indicated on drawings. Replace in kind as needed.

C. Mortar:

1. Cement: ASTM C91/C91M, Type M.
2. Sand: ASTM C144, uniformly graded and free from organic materials.
3. Mix: Premixed or site mixed, ASTM C270, Type M mortar.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine structural roof deck for compliance with specified requirements, and verify that roof penetrations and roof openings are correctly installed in proper locations.

B. Do not begin installation of tile roofing until substrates have been properly prepared, and if substrate preparation is responsibility of another installer, notify Designer of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Prepare roof deck surfaces using methods recommended by tile manufacturer for achieving best results under project conditions.

B. Seal roof deck joints wider than 1/16 inch (1.5 mm) with deck tape (if exposed).

C. At areas where elastomeric membrane underlayment will be installed, fill knot holes and surface cracks with latex filler, or cover knot holes with sheet metal.

D. Install eave edge and gable edge flashings tight with fascia, in accordance with SMACNA (ASMM) recommendations, lap joints minimum 2 inches (50 mm), and seal with plastic cement.

3.03 INSTALLATION

A. Install clay tile roofing system in accordance with manufacturers recommendations and NRCA (RM) applicable requirements.

B. Eave Protection: Install from eave edge to minimum 2 ft (610 mm) up-slope beyond projected interior face of exterior wall.
   1. Install eave protection membrane in accordance with manufacturer’s installation instructions for project substrate.

C. Underlayment:
   1. Roof Slopes Less Than 4/12: Install one layer of elastomeric membrane underlayment over entire roof area, perpendicular to roof slope, with ends and edges weather lapped a minimum of 4 inches (100 mm), and staggering end laps of each layer.
   2. Roof Slopes From 4/12 To 20/12: Install two layers of organic felt underlayment over entire roof area, perpendicular to roof slope, with ends and edges weather lapped a minimum of 4 inches (100 mm), staggering end laps of each layer, and nail in place.

D. Valley Protection Membrane: Install full width elastomeric membrane underlayment centered at valleys, in accordance with manufacturer92s installation instructions for project substrate. Weather lap joints a minimum of 12 inches (305 mm).

E. Metal Valley Flashings:
   1. Open Valleys: Install minimum 24 inch (610 mm) wide flashing over valley protection membrane, centered over valley and crimped to guide water flow; fasten to deck with cleats, overlapping end joints minimum 8 inches (200 mm), and blind nailing upper end of each sheet; do not solder joints.

F. Sheet Metal Flashing: Install flashing at other locations as indicated and as required by project conditions.

G. Attachment Members:
   1. Nailers: Install nailers at ridge and hips, directly over underlayment; protect with additional layer of underlayment before installing ridge and hip tiles and accessories.
   2. Battens: Install battens horizontally, fastening securely to deck through underlayment.

H. Clay Tile:
   1. Install first row of tile at eaves with minimum projection of 1 inch (25 mm).

2. Lay tile square with building lines and parallel with roof slope, and install filler, closure, and mitered pieces as required.
3. Unless otherwise indicated or recommended by tile manufacturer, install tile with minimum of 3 inch (75 mm) headlaps.
4. Nail tiles by driving nails to point where nail heads just clear surface of tile, so tiles hang on nails; do not overdrive nails by putting pressure on underlying tile, and do not underdrive nails and put strain on overlying tile.
5. Cut and fit tiles neatly around vents, pipes, and other projections.
6. Install accessories in accordance with manufacturer's details and recommendations.

3.04 PROTECTION

A. Minimize traffic over finished roof surface; where walking on roof is necessary, wear soft-soled shoes and walk on abutting tiles to avoid breakage.

B. Remove and replace damaged or broken tile before Date of Substantial Completion.

END OF SECTION 07 3213

SECTION 07 4114
METAL ROOF PANELS - ENGINE 20

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Repairs of architectural roofing system of preformed steel panels, as needed, including replacement of sealants, rivets/fasteners, penetration flashing, etc.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Roof sheathing.

B. Section 07 9200 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

1.03 REFERENCE STANDARDS

A. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference 2005 (Reapproved 2017).

1.04 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
   3. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.

D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

E. Test Reports: Indicate compliance of metal roofing system to specified requirements.

F. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design:

B. Architectural Metal Roof Panels:
   1. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
   1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.
   2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
   3. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F (56 degrees C).

2.03 ARCHITECTURAL METAL ROOF PANELS

A. Architectural Metal Roof Panels: Repair in kind with existing.

B. Architectural Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

C. Architectural Metal Panels: Factory-formed panels with factory-applied finish.
   1. Texture: Smooth.
   2. Width: Maximum panel coverage to match existing.

2.04 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 ACCESSORIES

A. Miscellaneous Sheet Metal Items for Repairs: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

C. Sealants:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

D. Snow Guards: Replace in kind with existing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Designer of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.

B. Remove protective film from surface of roof panels immediately prior to installation. Strip film carefully, to avoid damage to prefinished surfaces.

C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.

D. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
   1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
   2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

C. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.

3.04 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION 07 4114

SECTION 07 5400
THERMOPLASTIC MEMBRANE ROOFING - ENGINE 8

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adhered system with thermoplastic roofing membrane.

B. Insulation, flat and tapered.+

C. Deck Preparation.

D. Cover boards.

E. Membrane Flashings.

F. Roofing stack boots and walkway pads.

G. Edge Metal

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry - Engine 4, 5, 8, 20 & 24: Wood nailers and curbs.

B. Section 07 0150.19 - Preparation for Re-Roofing - Engine 4, 5, 8, 20 & 24.

C. Section 07 6200 - Sheet Metal Flashing and Trim - Engine 4, 5, 8, 20 &24: Counterflashings, and Reglets

D. Section 07 7100 - Roof Specialties - Pre-Manufactured Warranted Edge Metal - Engine 4, 5 & 24:

E. Section 07 9200 - Joint Sealants

F. Section 22 1426 Roof Drains and Piping: Roof drains.

G. Section 23 0510 - Mechanical and Electrical General Requirements

1.03 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2021.

C. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2000.

D. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing 2021.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.

F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

G. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces 2011 (Reapproved 2019).

H. FM DS 1-28 - Wind Design 2016.

I. NRCA (RM) - The NRCA Roofing Manual 2019.

J. NRCA ML104 - The NRCA Roofing and Waterproofing Manual Fifth Edition, with interim updates.

K. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to

defective manufacture, fabrication, installation or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Pre-installation Meeting: Convene one week before starting work of this section.
   1. Review preparation and installation procedures and coordinating and scheduling required with related work.

C. Completed roof system assembly shall comply with UL Class A fire rating and FM 1-90 classification.

D. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7-16.

E. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittal Procedures.

B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, surfacing, and fasteners.

C. Special Project Warranty Specimen: For approval.

D. Shop Drawings: Indicate joint or termination detail conditions.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Warranty Documentation:
   1. Submit Special Project Manufacturers' warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   2. Submit installer's certification that installation complies with warranty conditions for waterproof membrane.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with NRCA ML104 and manufacturer's instructions.

B. Roof drains must be tested prior to commencement of any roof demolition. Contractor to verify and certify that the drain lines are clear by statement to the Owner's Representative and Designer on the Contractor's letterhead.

C. Take care to avoid contamination of the new membrane with debris.

D. Source Limitations: Obtain components including roof insulation for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

E. Provide protection of the adjacent roof areas during demolition to protect from windblown bitumen debris. No tolerance will be provided for heavy traffic markings on the newly installed roof surface.

F. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 20 years of documented experience.

G. Installer Qualifications: Company specializing in performing the work of this section with at least Five years of documented experience.
   1. With minimum 5 years' experience.
   2. Provide Manufacturer's "Applicator in good standing" approval letter specific for this specification.
   3. Approved by membrane manufacturer for installations that have achieved similar warranty performance requirements and terms including membrane, insulation and perimeter metal flashings.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact.

B. Store materials in weather protected environment, clear of ground and moisture.

C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

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. All insulation to have a secondary tarp applied over the shrouded bundles after the plastic wrapping is cut to provide ventilation.

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

1.08 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 membrane to damp or frozen deck surface or when precipitation is expected or occurring.

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

D. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.09 WARRANTY

A. Contractors' Warranty: Provide Contractors' warranty agreeing to correct workmanship defects within 5 years after installation.

B. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
   1. Roof Area A - Project Warranty Term: NDL 10 years, with a 10 year extended Material Only Warranty.
   2. For repair and replacement include costs of both material and labor in warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Thermoplastic Polyolefin (TPO) 60 mil Membrane Roofing Materials:
   1. Carlisle Roofing Systems, Inc; Sure-Weld TPO: www.carlisle-syntec.com/#sle.
   2. Johns Manville: www.jm.com/#sle.
   3. Versico, a division of Carlisle Construction Materials Inc; VersiWeld TPO: www.versico.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Roof membrane manufacturers and accessories:
   1. Carlisle Roofing Systems, Inc, Carlisle, PA
   2. Sarnafil, Inc. Roofing and Waterproofing Systems, Canton, MA. (Sika Sarnafil - Sika-Plan Membrane Only)
   3. Johns Manville.
   4. Versico, LLC, Carlisle, PA.

C. Insulation:
   1. Carlisle SynTec; SecurShield Insulation: www.carlisle-syntec.com/#sle.
   2. Sika, USA, Sarnatherm; usa.sika.com

3. Hunter Panels, LLC: www.hpanels.com.
4. Versico Roofing Systems; SecurShield Insulation: www.versico.com/#sle.
5. Or as approved by roof system manufacturer.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROOFING - UNBALLASTED APPLICATIONS

A. Thermoplastic Membrane Roofing: One ply membrane, fully adhered, over insulation and coverboard. All new roof systems will be constructed to be approved as solar ready.

B. Roofing Assembly Requirements:
1. Solar Reflectance Index (SRI): 78, minimum, calculated in accordance with ASTM E1980.
a. Field applied coating may not be used to achieve specified SRI.
2. Roof Covering External Fire Resistance Classification: UL (FRD) Class A.
3. Factory Mutual Classification: Class 1 and windstorm resistance of 1-90, in accordance with FM DS 1-28.

C. Acceptable Insulation Types - Constant Thickness Application: Any of the types specified.
1. Minimum 2 layers of polyisocyanurate board.
2. Alternate Bottom layer of polyisocyanurate board covered with single layer of polyisocyanurate board.
3. All insulation will be required to receive a coverboard recommended by the manufacturer, but not less than 1/2".

D. Acceptable Insulation Types - Tapered Application: 1/4" or as approved to minimize water pooling.(if required and shown in contract plans)
1. Uniform thickness polyisocyanurate board covered with tapered polyisocyanurate board and a manufacturer approved coverboard.
2. Coverboard should be a minimum 1/2" high density polyisocyanurate Type 2, Class 4 (min.100 psi).

2.03 MEMBRANE ROOFING AND ASSOCIATED MATERIALS:

A. Membrane Roofing Materials:
1. TPO: Thermoplastic polyolefin (TPO) complying with ASTM D6878/D6878M, sheet contains reinforcing fabrics or scrims.
a. Thickness: 60 mil, 0.060 inch (1.5 mm), minimum.
2. Reinforcing: Internal fabric.
3. Min. Thickness for all approved TPO membranes meeting the ASTM D4434 specifications, nominal 60 mil membrane.
4. Sheet Width: Factory fabricated into largest sheets possible.
5. Solar Reflectance: 0.75, minimum, initial, and 0.65, minimum, 3-year, certified by Cool Roof Rating Council.
6. Thermal Emissivity: 0.80, minimum, initial, and 0.79, minimum, 3-year, certified by Cool Roof Rating Council.
7. Color: White.

B. Seaming Materials: Hot air welded.

C. Membrane Fasteners: As recommended and approved by membrane manufacturer.
1. Disc Washers and Screws: as approved by manufacturer.

D. Flexible Flashing Material: 60 mil PTPO Material recommended by membrane manufacturer.
1. 60 mil asphalt resistance membrane must be used at all transitions and intersections with existing parapet walls, and penetrations where asphalt residue cannot be 100% removed.

2.04 ROOF INSULATION

A. Polyisocyanurate Board Insulation (base layer of insulation): Closed cell polyisocyanurate foam with black glass-reinforced mat laminated to faces, complying with ASTM C1289 Type II, Class 2 or 3, with the following additional characteristics:
1. Board Thickness: 2.0 inch.

2. Minimum thickness at the drains: 1.00 inches.
3. Size: 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
4. Compressive Strength: 20 psi (138 kPa), minimum, when tested in accordance with ASTM C1289.
5. UL-Classified and FM-approved for direct to steel deck applications.
6. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.

B. Cover Board: Polyisocyanurate (ISO) HD board insulation complying with ASTM C1289, and the following characteristics:
1. Classification: Type II, Class 4 - Faced with coated or uncoated polymer-bonded glass fiber mat facers on both major surfaces of the core foam.
2. Compressive Strength: 100 psi (689 kPa).
3. Board Thickness: 1/2 inch (12.7 mm).

2.05 ACCESSORIES

A. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane. All penetrations are to be made watertight with compatible flexible membrane, or approved liquid applied material that is acceptable to the manufacturer in achieving the special project warranty. Pitch pockets are not to be installed unless prior approval is requested and approved by the Designer, BLUEFIN LLC, a division of Mantis Innovation .

B. Precut Tapered Insulation:
1. Manufacturers:
a. Roof Crickets and Saddles shall be pre-manufactured, pre-cut with a min. 1/2" slope..
b. Min.8' x 8' sump, 2.0" min. 1/2" slope at sump and transition to 1/4" slope in the field.
c. Substitutions: See Section 01 6000 - Product Requirements.

C. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches (152 mm) wide; self adhering.

D. Insulation Fasteners/adhesive: Appropriate for purpose intended and approved by roofing manufacturer. Fasteners may be used to attach the fire barrier over the metal deck. All other insulation is to be attached using an approved insulation adhesive. All attachments must meet or exceed the ANSI/SPRI and ASCE/SEI 7-16 wind uplift requirements for the installation region.

E. Membrane Adhesive: As recommended by membrane manufacturer.

F. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

G. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.

H. Insulation Adhesive: As recommended by insulation manufacturer.

I. Roofing Nails: stainless type, size and configuration as required to suit application.

J. Sealants: As recommended by membrane manufacturer.

K. Sacrificial Membrane; Provide additional membrane strips at all solar array, conduit and other piping that requires a raised support.

L. Walkway Pads: Allowance - LF T.B.D. - Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
1. Composition: Roofing membrane manufacturer's standard.
2. Surface Color: as approved by Owner.
3. Walkpads will be provided at all roof access points, roof to roof stepping points, and mechanical access doors. Additionally, include 50 lf. of walkpads for maintenance access

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual, manufacturer's instructions, and ASCE 7.16 wind design requirements in accordance with the local wind-speed maps.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

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

F. Coordinate the work with installation of associated counter flashings installed by other sections as the work of this section proceeds.

3.02 EXAMINATION

A. Contractor to perform documented peel test of the vapor barrier prior to commencement of tapered roof insulation and new TPO membrane roof system. Manufacturer's approval must be received prior to new roof installation.

B. Verify that all roof drains are open and free flowing. Contractor is to provide documentation that a 20 minute water test was completed at all existing roof drains. The water test is to be completed in the presence of a third party Quality Assurance inspector that is a qualified RRO as defined by IIBEC (International Institution of Building Envelope Consultants)

C. Verify that surfaces and site conditions are ready to receive work.

D. Verify deck is supported and secure.

E. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

F. Verify deck surfaces are dry and free of snow or ice.

G. Verify that roof openings, curbs and penetrations through roof are solidly set, and nailing strips are in place.

3.03 PREPARATION

A. For existing roofs, Contractor shall conduct an underside inspection to include a thorough review of items attached to the roof deck. Items such as conduits, lights and ceilings may be impacted by a roof and deck replacement. The full scope of this work must be documented and an approach established to address these items prior to beginning any re-roofing project.

B. For existing roofs, Contractor shall evaluate the condition of the roof deck prior to commencement of vapor retarder or insulation attachment. All deficiencies are to be photo documented and relayed to the onsite Quality Assurance Observer or the Project Designer for verification of the needed repair.

3.04 INSTALLATION - GENERAL

A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

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

3.05 INSULATION APPLICATION

A. Attachment of Insulation: Embed insulation in adhesive in full contact, in accordance with roofing and insulation manufacturers' instructions.

B. If multiple layers of insulation are required, lay subsequent layers of insulation with joints staggered minimum 6 inch (150 mm) from joints of preceding layer.

C. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

D. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

E. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

F. At roof drains, use factory tapered boards to provide positive slope to the drains over 4 foot distance (min. 8' x 8' sump)

G. Do not apply more insulation than can be covered with membrane in same day.

3.06 MEMBRANE APPLICATION

A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.

B. Shingle joints on sloped substrate in direction of drainage.

C. Fully Adhered Application: Apply adhesive to substrate in accordance with membrane manufacturer or 1.5 gal/square (100 L/sq m) Fully embed membrane in adhesive except in areas directly over or within 3 inches (75 mm) of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.

D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches (75 mm) . Seal permanently waterproof. Apply uniform bead of sealant to joint edge, if required by the membrane manufacturer.

E. At intersections with vertical surfaces:
   1. Extend membrane up a minimum of 4 inches (100 mm) onto vertical surfaces.
   2. Secure flashing to nailing strips at 4 inches (100 mm) on center, or as approved my membrane manufacturer

F. At gravel stops, extend membrane under gravel stop and to the outside face of the wall.

G. Around roof penetrations, seal flanges and flashings with flexible flashing.
   1. Install in accordance with these specifications as modified hereinafter..

H. Coordinate installation of roof drains and sumps and related flashings.

3.07 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field quality control and inspection.

B. Require site attendance of roofing and insulation material manufacturers at the start-up during the initial installation of the new roof system.

C. Contractor is to provide photo documentation and logged daily seam test samples. All samples must be numbered and dated with the location identified on the site roof plans.

3.08 CLEANING

A. Remove bituminous markings from finished surfaces.

B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.

C. Repair or replace defaced or damaged finishes caused by work of this section.

3.09 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07 5400

SECTION 07 5419
POLYVINYL-CHLORIDE ROOFING - ENGINE 24

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adhered roof system with polyvinyl-chloride (PVC) roofing membrane.

B. Cover boards.

C. Insulation.

1.02 RELATED REQUIREMENTS

A. Section 03 0100 - Maintenance of Concrete

B. Section 06 1000 - Rough Carpentry:

C. Section 07 0150.19 - Preparation for Re-Roofing.

D. Section 07 6200 - SHEET METAL FLASHING AND TRIM.

E. Section 07 7100 - Roof Specialties - Pre-Manufactured Warranted Edge Metal:

1.03 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2019.

C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2020.

D. ASTM D4434/D4434M - Standard Specification for Poly(Vinyl Chloride) Sheet Roofing 2021.

E. ASTM D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method 1983 (Reapproved 2018).

F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

G. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces 2011 (Reapproved 2019).

H. FM (AG) - FM Approval Guide current edition.

I. FM DS 1-28 - Wind Design 2016.

J. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components 2016, with Editorial Revision (2020).

K. NRCA (RM) - The NRCA Roofing Manual 2019.

L. UL (DIR) - Online Certifications Directory Current Edition.

M. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.
   1. Review preparation and installation procedures, in addition to coordination and scheduling required with related work.

1.05 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's written information listed below.
   1. Product data indicating membrane materials, flashing materials, insulation, surfacing, and fasteners.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements.

C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, mechanical fastener layout, and walk pad layout.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions, finish coating installation, special procedures, and perimeter conditions requiring special attention.

F. Manufacturer's Qualification Statement.

G. Installer's Qualification Statement.

H. Warranty Documentation.
   1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   2. Submit installer's certification that installation complies with required warranty conditions for waterproofing membrane.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least twenty years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least Ten years documented experience.
   1. Current Contractor in Good Standing letter from Manufacturer for Special Project Warranty on the Manufacturers' letterhead.
   2. Extend manufacturer's "No Dollar Limit" warranty.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in weather protected environment, clear of ground and moisture.

B. Comply with requirements from Owner to prevent overloading or disturbance of structure when loading materials onto roof.

1.08 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather, and refer to manufacturer's written installation instructions.

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

C. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.

D. Do not allow grease, oils, fats, or other contaminants to come into direct contact with roofing membrane.

1.09 WARRANTY

A. System Warranty: Provide manufacturer's system NDL warranty agreeing to repair or replace roofing membrane that leaks or is damaged due to wind or other natural causes.
   1. System Warranty Term: 25 years.
   2. For repair and replacement include costs of both material and labor in warranty.
   3. Include pre-manufactured metal roof edge wind and water tightness warranty in accordance with manufacturer's standard warranty terms.

B. Contractor's Warranty: Provide Contractor's 5-year Labor Workmanship Warranty as defined by the MWRCA contractor's warranty guidelines.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Sika Sarnafil

B. Carlisle SynTec

C. Johns Manville

2.02 ROOFING APPLICATIONS:

A. 80 mil PVC (Polyvinyl-Chloride) Membrane Roofing: Single-ply membrane.
   1. Adhered, over cover board insulation.

2.03 PERFORMANCE / DESIGN CRITERIA

A. Solar Reflectance Index (SRI): Minimum of 64 based on three-year aged value; if three-year aged data is not available, minimum of 82 initial value, calculated in accordance with ASTM E1980.
   1. Field applied coating may not be used to achieve specified SRI.

B. Wind Uplift:
   1. Designed to withstand wind uplift forces calculated in accordance with ASCE 7.
   2. Design Wind Speed: In accordance with local building code and authorities having jurisdiction (AHJ).

C. Factory Mutual Classification: Class 1 with windstorm resistance of 1-90, in accordance with FM DS 1-28.

D. Insulation Thermal Resistance (R-Value): Provide R-Value over entire roof deck in accordance with local building code requirements.- Existing flashing heights may require modifications to the current acceptable flashing heights.

E. Drainage: No standing water within 48 hours after precipitation.

2.04 ROOFING MEMBRANE MATERIALS

A. Single Source Responsibility: Provide and install products from single source.

B. Membrane: Polyvinyl-Chloride (PVC); ASTM D4434/D4434M, internally reinforced.
   1. Thickness: 80 mils, 0.080 inch (2.0 mm), minimum.
   2. Sheet Width: Factory fabricated into largest sheets possible.

C. Seaming Materials: As recommended by membrane manufacturer.

D. Flexible Flashing Material: Same material as roofing membrane.

E. Base Flashing: Provide waterproof, fully adhered base flashing system at penetrations, plane transitions, and terminations.

2.05 INSULATION

A. When applicable, insulation shall be installed in multiple layers. The first and second layer of insulation shall be adhered to the substrate in accordance with the manufacturer’s published specifications.

B. Insulation shall be polyisocyanurate. Minimum average R-value required is 30 at roof replacements, unless specified otherwise.

C. Roof Insulation:
   1. Polyisocyanurate Board Insulations: Closed cell polyisocyanurate foam with black glass-reinforced mat laminated to faces, complying with ASTM C1289 Type II, Class 1, with the following additional characteristics:
      a. Minimum thickness at the drains: 2.00 inches.
      b. Compressive Strength: 25 psi (138 kPa) when tested in accordance with ASTM C1289.
      c. UL-Classified and FM-approved for direct to steel deck applications.
      d. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.

D. Insulation at Crickets and Sumps:
   1. Polyisocyanurate tapered board stock at crickets and sumps: Boards shall have bonded fiber glass mat facer sheets. Insulation shall comply with ASTM C1289, Type II, Class 1, glass fiber mat both faces; Grade 1; UL and FM Class 1classified; LTTR values in accordance with CAN/ULC-S770. When adhering boards, maximum board size shall be

factory cut 4' x 4'. Physical properties; Dimensional stability ASTM D2126, less than 2%; Density of foam core, ASTM D1622, nominal 2 pounds per cubic foot; Compressive strength, ASTM 1621, 25 psi nominal.

a. Tapered Insulation System: See Hunter Panel's Recommended Design Tapered Drawing or approved equal. Submit final design to Owner for review.
    1) Drain Sump:
        (a) Starting Thickness: Two inch.
        (b) Slope: min.1/4-inch per lineal foot.
        (c) Minimum - 8' x 8' sumps
    2) Crickets: Provide as indicated on approved layout submittal and at upslope side of curbed penetrations.(see attached construction drawings)
        (a) Starting Thickness: 1/2-inch.
        (b) Slope: 1/2-inch per lineal foot.
        (c) Curb crickets are required at all units greater that 24" (inches) perpendicular to the designed slope

2.06 COVER BOARD

A. Buildings:
1. Cover Board.: Adhered Polyisocyanurate High-Density Board. Class A. Complying with ASTM C1278 and with the following additional characteristics at Roof Areas with slope over 1/2":12" only.
    a. Size: 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
    b. Thickness: 1/2 inch.
    c. Surface Water Absorption: 1.6 g, maximum, when tested in accordance with ASTM C473.
    d. R-Value: 2.5 as per ASTM C518.
    e. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
    f. Mold Growth Resistance: 10, when tested in accordance with ASTM D3273.

2.07 ACCESSORIES

A. Prefabricated Flashing Accessories:
1. Corners and Seams:
    a. Inside Corners: Pre-molded PVC, 60 mil (0.060 inch) (1.5 mm) thick; used for flashing inside corners.
        1) Color: White.
    b. Outside Corners: Pre-molded PVC, 60 mil (0.060 inch) (1.5 mm) thick; used for flashing outside corners.
        1) Color: White.
    c. Curb Wrap Corners: PVC or KEE HP, 60 mil (0.060 inch) (1.5 mm) thick; used for flashing wraps at curb corners.
        1) Color: White.
    d. T-Joint Covers: PVC, non-reinforced, 4 inch (102 mm) diameter; used to seal step-offs at splice intersections.
        1) Color and Thickness: White and 60 mil (0.060 inch) (1.5 mm) thick.
2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
    a. Pipe Seals: Prefabricated PVC flashing for pipes 1 inch (25.4 mm) to 6 inch (152 mm) in diameter.
    b. Molded Pipe Seals: Injection-molded PVC flashing for pipes 3/4 inch (19 mm) to 8 inch (203 mm) in diameter.
        1) Color: White.
    c. Square Tubing Wraps: Fabricated PVC flashing for penetrations, 3 inch (76 mm) square, with 11 inch (279 mm) overall height.

d. Sealant Pockets: Interlocking, two-piece, injection molded flexible pocket with rigid 6 inch (152 mm) high vertical flange and pre-formed deck flange, used to waterproof pipe clusters or other oddly shaped penetrations.
1) Pocket Adjustment: Adjustable from 7-1/2 inch (191 mm) to 11-1/2 inch (292 mm) long.

B. Insulation Adhesive: Two component polyurethane, expanding foam.

C. Fasteners: Appropriate for application indicated as recommended and approved by membrane manufacturer.
1. Length as required for thickness of membrane and insulation material and penetration of deck substrate; with metal washers.
2. Seam Fastening Plate: Use 2 inch (51 mm) diameter metal plate for insulation attachment on mechanically fastened systems, or membrane securement at angle changes on adhered systems with manufacturer's acceptable fasteners.
3. Insulation Fastening Plate: Use 3 inch (76 mm) nominal diameter metal plate with manufacturer's acceptable fasteners to attach insulation.
4. Metal, Insulation Fastening Plates: Hexagon shaped galvalume-coated steel plate, with 2-7/8 inch (73 mm) hexagon width.

D. Walkway Rolls: Heat weldable Textured PVC membrane, 36 inch (914 mm) wide by 60 feet (18.3 m) long, and 90 mils, 0.090 inch (2.3 mm) thick, gray colored; used to protect PVC membrane in areas exposed to foot traffic.

E. Miscellaneous Flashing: Non-reinforced PVC membrane; 60 mils, 0.060 inch (1.5 mm) thick, in manufacturer's standard lengths and widths. Asphalt resistant membrane flashing is to be used at all locations where existing bituminous flashings were removed in preparation for the new PVC membrane.

F. Membrane Adhesive: As recommended by membrane manufacturer.
1. Bonding Adhesive: Low-VOC, water-based, wet lay-in, one-sided dispersion adhesive and light tan colored.
2. Bonding Adhesive: Low-rise polyurethane adhesive, two-component, and construction-grade.
a. Compatible with Recovery Board, VersiCore MP-H Polyiso, SecurShield CD, SecurShield HD Plus, SecurShield Polyiso, EPS, XPS, SPF, DensDeck, SecuRock, and DuraFaceR.
b. Deck Types: Concrete, cellular lightweight concrete, gypsum, cementitious wood fiber, wood, and painted or galvanized steel.

G. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

H. Sealants: As recommended by membrane manufacturer.
1. Sealant: One-component, 100 percent solids, solvent-free, polyether sealant used to provide weather-tight seal.
2. Cut-Edge Sealant: Free-flowing, translucent polymeric material used for sealing cut edges; clear colored.
3. Pourable Sealant: One-component, moisture curing, elastomeric polyether sealant; white colored.

I. Membrane Cleaner: Manufacturer's recommended products for applications indicated.

J. Primer: Manufacturer's recommended products for applications indicated.

K. Roof Edgings and Terminations: Manufacturer's standard roof edge and termination accessories.
1. Color: As selected by Architect.
2. Drip Edge System: Drip edge system with decorative cover over continuous L-shaped cleat and slotted fastening holes at 12 inch (305 mm) on center.
a. Cover Height: 9-3/4 inch (248 mm), nominal.

3. Roof Edge: Roof edge system with galvanized formed rail having pre-punched fastening slots, and stainless steel spring to lift cover at 4 feet (1.2 m) on center.
    a. Cover Height: 4 inch (102 mm), and top edge extending 1-1/8 inch (28.6 mm) above roof surface.
4. Coping: Parapet wall type coping system providing galvanized steel hold-down cleats and snap-on coping cap.
    a. Parapet Wall Width: Verify in field.
    b. Face and Back Leg Heights: 4 inch (102 mm) face height, and 4 inch (102 mm) back height, nominal.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and nailing strips and reglets are in place.

3.02 SURFACE PREPARATION

A. Clean substrate thoroughly prior to roof application.

B. Do not begin this work until other work that requires foot or equipment traffic on roof has been completed.

3.03 CONCRETE DECK PREPARATION

A. Fill all open deck joints with approved firestopping backer rod and sealants

B. Verify dry concrete deck moisture content using plastic sheet method in accordance with ASTM D4263.

3.04 INSTALLATION - GENERAL

A. Install roofing system in accordance with manufacturer's instructions, as well as NRCA (RM) applicable requirements.

B. Application of roofing membrane during unsuitable weather is not permitted.

C. Application of roofing membrane when ambient temperature is outside temperature range recommended by manufacturer is not permitted.

D. Application of roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring is not permitted.

E. Exposing materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day is not permitted.

3.05 INSULATION APPLICATION

A. Attachment of Insulation: Embed insulation in adhesive and in full contact to deck in accordance with roofing and insulation manufacturer's instructions.
    1. Embed second layer of insulation into full bed of adhesive in accordance with roofing and insulation manufacturer's instructions.

B. Attachment of Cover Board: Embed high density polyisocyanurate cover board into full bed of adhesive over second layer of insulation in accordance with roofing and insulation manufacturer's instructions.

C. Installing wet, damaged, or warped insulation boards is not permitted.

D. Apply subsequent layers of insulation with joints staggered minimum 6 inch (152 mm) from joints of preceding layer.

E. Apply tapered insulation to required slope pattern in accordance with manufacturer's instructions.

F. Apply boards with edges in moderate contact without forcing, and with gap between boards no greater than 1/4 inch (6 mm) wide; cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

G. At roof drains, use factory-tapered boards or boards cut to slope to slope down to roof drains over an 8' x 8' sump

H. Only apply quantity of insulation than can be completely waterproofed in same day.

3.06 MEMBRANE APPLICATION

A. Roll out membrane, free from wrinkles or tears; place sheet membrane into place without stretching.

B. Shingle joints on sloped substrates in direction of drainage.

C. Adhesive Adhered Membrane Application: Apply adhesive at manufacturer's recommended rate, and fully embed membrane in adhesive except in areas directly over or within 3 inch (75 mm) of expansion joints; fully adhere one roll before proceeding to adjacent rolls.

D. Seam Welding:
   1. Overlap edges and ends at least 2 inch (51 mm), and seal seams by heat welding.
   2. Probe each seam once welds have thoroughly cooled, approximately 30 minutes.
   3. Repair any deficient seams within same workday.
   4. Seal cut edges of reinforced membrane after seam probe has been completed.
      a. Seal with cut edge type sealant as recommended by membrane manufacturer.

E. At membrane intersections with vertical surfaces, provide the following:
   1. Fully adhere flexible flashing over membrane and up to nailing strips.
   2. Secure flashing to nailing strips at 4 inch (102 mm) on center, maximum.

F. At gravel stops, extend membrane under gravel stop and to outside face of wall.

G. Install roofing expansion joints as indicated on drawings, and ensure joints are watertight.

H. Coordinate installation of roof related flashings, sumps, and drains; locate field splices away from low areas and roof drains, and shingle lap upslope sheets over downslope sheets.

I. Daily Seal: Provide daily seal in accordance with manufacturer's installation instructions at end of each workday to prevent infiltration of water at incomplete flashings, terminations, and other unfinished membrane edges.

3.07 FIELD QUALITY CONTROL

A. Attendance is required on-site of roofing and insulation material manufacturer's at least two times during installation of this work.

3.08 CLEANING

A. Remove wrappings, empty containers, paper, and other debris from roof daily, and dispose of debris in compliance with local, State, and Federal regulations.

B. Remove bituminous markings from finished surfaces.

C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.

D. Repair or replace defaced or damaged finishes caused by work of this section.

3.09 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. This project will require interior protection. All work must conform to CFR Title 21 FDA regulations to protect against contamination in continuous food processing production.

C. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07 5419

SECTION 07 5423
THERMOPLASTIC MEMBRANE ROOFING - ENGINE 4 & 5

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Engine Company 4 - The Scope of Work for this project includes a roof replacement with a new UL Class A, 60 mil TPO / PVC insulated roof system on all low sloped roof areas, A, B C and D to achieve a minimum 20 -year NDL warranty.

B. Engine Company 5 - The Scope of Work for this project includes a roof replacement with a new UL Class A, 60 mil TPO / PVC insulated roof system on all low sloped roof areas, A, and B to achieve a minimum 20 -year NDL warranty.

1.02 SUMMARY

A. Engine Company 4 ;Furnish and install new thermoplastic membrane roofing system as called out in the contract documents, including:
   1. The Base Bid Roof Replacement for Roof Areas A, B, C and D consists of the following: Remove the existing sprayed in place polyurethane roof system and the base 3 ply built-up roof system down to the existing concrete roof deck and properly dispose of the same in accordance with local codes and ordinances. The new roof system shall be installed to meet or exceed all local and national codes for aa UL Class A and FM I-90 application. The new roof system shall consist of a 30 mil SBS vapor retarder, a base layer of 2" CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), second layer of Tapered CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), a new ½" CGF HD coverboard ASTM C 1289 Type II Class 4 Grade 2(100 +psi) (R-total =33.00) and an adhered 60 mil TPO / PVC roof membrane. Additional work includes adding 2x wood nailers to roof edge and roof curbs to accommodate new roof insulation thickness to achieve manufacturers' minimum flashing height of 8" from the finished roof surface. All new roofing is to be installed for the special project warranty requirements to meet or exceed the manufacturers 20 year total system NDL warranty.

B. Engine Company 5; Furnish and install new thermoplastic membrane roofing system as called out in the contract documents, including:
   1. The Base Bid Roof Replacement for Roof Areas A, and B consists of the following: Remove the existing sprayed in place polyurethane roof system and the base 3 ply built-up roof system down to the existing wood plank roof deck and properly dispose of the same in accordance with local codes and ordinances. The new roof system shall be installed to meet or exceed all local and national codes for aa UL Class A and FM I-90 application. The new roof system shall consist of a mechanically attached ½" base glass faced gypsum fire barrier board, a 30 mil SBS vapor retarder, a base layer of CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), second layer of CGF isocyanurate roof insulation, ASTM C 1289 Type II, Class 2 Grade 2 (20psi), and a new ½" CGF HD coverboard ASTM C 1289 Type II Class 4 Grade 2(100 +psi). All construction layers to achieve an R-total =33.00. The new roof covering is to be an adhered 60 mil TPO / PVC roof membrane. Additional work includes adding 2x wood nailers to roof edge and roof curbs to accommodate new roof insulation thickness to achieve manufacturers' minimum flashing height of 8" from the finished roof surface. All new roofing is to be installed for the special project warranty requirements to meet or exceed the manufacturers 20 year total system NDL warranty.

C. Related Scope of Work:
   1. Follow roofing manufacturer's requirements for the specified special project warranty.
   2. Removal of all existing roofing materials to the structural deck and base wall substrates
   3. Preparation of roofing substrates.
   4. New wood nailers for roofing attachment.
   5. New roof insulation as specified.

6. Cover boards.
7. TPO / PVC Thermoplastic membrane roofing.
8. New Roof drains
9. New gutters and downspouts
10. Metal roof edging and copings.
11. Miscellaneous metal flashing and counterflashing.
12. Additional roof compatible walkway - 50 linear feet for each roof
13. Other roofing-related items specified or indicated on the drawings or otherwise necessary to provide a complete weatherproof roofing system.

D. Disposal of demolition debris and construction waste is the responsibility of Contractor. Perform disposal in manner complying with all applicable federal, state, and local regulations.

E. The basis for this specifications is written around a Firestone 60 mil TPO membrane system. Alternate materials will be reviewed and approved if they meet the minimum standards written in these specifications.

F. Commencement of work by the Contractor shall constitute acknowledgement by the Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer.

1.03 RELATED REQUIREMENTS

A. Section 07 62 00 - Sheet Metal Flashing and Trim: Formed metal flashing and trim items associated with roofing.

1.04 REFERENCES

A. Referenced Standards: These standards form part of this specification only to the extent they are referenced as specification requirements.
1. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2010.
2. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board; 2012.
3. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
4. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2013.
5. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer; 2009.
6. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2010.
7. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting; 2009.
8. ASTM D1079 - Standard Terminology Relating to Roofing and Waterproofing; 2013.
9. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2010.
10. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2008.
11. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
12. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2011a.
13. CAN-ULC-S770 - Standard Test Method Determination of L-Term Thermal Resistance Of Closed-Cell Thermal Insulating Foams; 2009.
14. FM DS 1-28 - Wind Design; Factory Mutual System; 2007.
15. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; Factory Mutual System; 2006.
16. PS 1 - Structural Plywood; 2009.

17. PS 20 - American Softwood Lumber Standard; 2010.
18. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2003. (ANSI/SPRI ES-1)

1.05 SUBMITTALS

A. Product Data:
   1. Provide membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.
   2. Where UL or FM requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified or FM-approved, as applicable; include data itemizing the components of the classified or approved system.
   3. Installation Instructions: Provide manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.
   4. Contractor is required to secure the Manufacturers' Project Approved Assembly letter specific to this project identifying all specifications, drawings and documents prepared in association with all contract documents and made part of this specification.
   5. The roof assembly is rated as a UL-A, and FM 1A-90.

B. Shop Drawings: Provide:
   1. The roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
   2. For tapered insulation, provide project-specific layout and dimensions for each board.

C. Pre-Installation Notice: Copy to show that manufacturer's required Pre Installation Notice (PIN) has been accepted and approved by the manufacturer.

D. Specimen Warranty: Submit prior to starting work.

1.06 QUALITY ASSURANCE

A. Applicator Qualifications: Roofing installer shall have the following:
   1. Current Manufacturer's Active and Certified Contractor status.
   2. At least five years experience in installing specified system.

B. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
   1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
   2. Notify Architect well in advance of meeting.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.

B. Store materials clear of ground and moisture with weather protective covering.

C. Keep combustible materials away from ignition sources.

1.08 WARRANTY

A. Comply with all warranty procedures required by manufacturer, including notifications, scheduling, and inspections.

B. Warranty: Manufacturers' 20 year NDL Warranty covering membrane, roof insulation, and membrane accessories.

C. 60 mil

D. 20 - years

E. Limit of Liability: No dollar limitation.

F. Scope of Coverage: Repair leaks in the roofing system caused by:
   1. Ordinary wear and tear of the elements.
   2. Manufacturing defect in Manufacturers' brand materials.
   3. Defective workmanship used to install these materials.
   4. Damage due to winds up to 55 mph.
   5. Not Covered:
      a. Damage due to winds in excess of 55 mph.
      b. Damage due to hurricanes or tornadoes.
      c. Unintentional damage due to normal rooftop inspections, maintenance, or service.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The basis of this specification is written around Firestone Roofing Systems: Firestone Building Products Co., Carmel, IN. www.firestonebpco.com.
   1. Roofing systems manufactured by others may be acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
      a. Specializing in manufacturing the roofing system to be provided.
      b. Minimum ten years of experience manufacturing the roofing system to be provided.
      c. Able to provide a no dollar limit, single source roof system warranty that is backed by corporate assets in excess of one billion dollars.
      d. ISO 9002 certified.
      e. Able to provide polyisocyanurate insulation that is produced in own facilities.
   2. Other acceptable manufacturers:
      a. Carlise SynTec Systems - Carlisle, PA ; www.carlislesyntec.com
      b. GAF - Parsippany, NJ; www.gaf.com

B. Manufacturer of Insulation and Cover Boards: Same manufacturer as roof membrane.

C. Manufacturer of Metal Roof Edging: Same manufacturer as roof membrane.
   1. Metal roof edging products by other manufacturers are not acceptable.
   2. Field- or shop-fabricated metal roof edgings are not acceptable.

D. Substitution Procedures: See Instructions to Bidders.
   1. Submit evidence that the proposed substitution complies with the specified requirements.

2.02 ROOFING SYSTEM DESCRIPTION

A. The existing roof system is to be prepared to receive the new TPO restorative membrane in accordance with the manufacturers' specifications including the removal of all identified "wet" areas marked and designated for replacement with new insulation equal in thickness to the height of the existing roof system.

B. Roofing System:
   1. Membrane: Thermoplastic Polyolefin (TPO) single-ply membrane.
   2. Thickness: 60 mil
   3. Membrane Attachment: Totally Adhered.
   4. Slope: Deck is sloped but not enough; provide additional slope of 1/4 inch per foot (1:48) by means of tapered insulation.
   5. Comply with applicable local building code requirements.
   6. Provide assembly having Underwriters Laboratories, Inc. (UL) Class A Fire Hazard Classification.
   7. Provide assembly complying with Factory Mutual Corporation (FM) Roof Assembly Classification, FM DS 1-28 and 1-29, and meeting minimum requirements of FM 1-90 wind uplift rating.

C. Fire Barrier Board (metal and wood roof decks only – Engine Company 5)
   1. ½" base glass faced gypsum fire barrier board
   2. Thickness: 1/2 inch.
   3. Width: 4 feet.
   4. Length: 4 feet
   5. Weight: 2.0 lb/sq. ft.
   6. Surfacing: Primed Fiberglass Mat.
   7. Flexural Strength, Parallel (ASTM C473): 80 lbf, minimum
   8. R-Value (ASTM C518): 0.56.
   9. Water Absorption (ASTM C473): Less than 5 percent of weight.
   10. Surface Water Absorption (ASTM C473): Nominal 1.0 grams.
      a. Compressive Strength (Applicable Sections of ASTM C472): Nominal 900 pounds per square inch.
      b. Flame Spread/ Smoke Development (ASTM E84): Not more than 0 Flame Spread, 0 Smoke Development
   11. Combustibility (ASTM E136): Noncombustible
   12. Fire resistance rating (UL 790 and ASTM E108): Class A
   13. Mold Resistance (ASTM D3273): Scored a 10

D. Insulation:
   1. This is a new roof system application and will be required to meet the local code for R-value.
   2. Minimum Board Thickness: 1.5 inches (at drain sumps only)
      a. Iso Insulation - Insulation
      b. R Value*
      c. Minimum 1.50 R-value = 8.6 (at drain sumps lowest point)
      d. Base Layer: 1.5" Polyisocyanurate foam board, non-composite.
         1) Attachment: Mechanical fastening.
      e. Total roof system R-value required by code must meet R=33.00

E. Cover Board: High Density Polyisocyanurate Cover Board:
   1. Thickness: 0.5 inch (12.7mm).
   2. R-Value: 2.5 based on ASTM tests C158 and C177.
      a. Attachment: Adhesive attachment.

F. Crickets and Saddles: Tapered insulation of same type as specified for top layer; slope as indicated.

2.03 TPO MEMBRANE MATERIALS

A. Roofing Membrane: Flexible, heat weldable sheet composed of thermoplastic polyolefin polymer and ethylene propylene rubber; complying with ASTM D6878, with polyester weft inserted reinforcement and the following additional characteristics:
   1. Thickness: 0.060 inch plus/minus 10 percent, with coating thickness over reinforcement of 0.030 inch (0.76 mm) plus/minus 10 percent.
   2. Puncture Resistance: 415 lbf (1868 N), minimum, when tested in accordance FTM 101C Method 2031.
   3. Solar Reflectance: 0.79 minimum, when tested in accordance with ASTM C1549.
   4. Color: White.
   5. Acceptable Product: Platinum TPO.

B. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

C. Curb and Parapet Flashing: Same material as membrane, with encapsulated edge which eliminates need for seam sealing the flashing-to-roof splice; precut to 18 inches wide.

D. Formable Flashing: Non-reinforced, flexible, heat weldable sheet, composed of thermoplastic polyolefin polymer and ethylene propylene rubber.
   1. Thickness: 0.060 inch plus/minus 10 percent.
   2. Tensile Strength: 1550 psi (10.7 MPa), minimum, when tested in accordance with ASTM D638 after heat aging.
   3. Elongation at Break: 650 percent, minimum, when tested in accordance with ASTM D638 after heat aging.
   4. Tearing Strength: 12 lbf (53 N), minimum, when tested in accordance with ASTM D1004 after heat aging.
   5. Color: White.
   6. Acceptable Product: TPO Flashing

E. Tape Flashing: 5-1/2 inch (140 mm) nominal wide TPO membrane laminated to cured rubber polymer seaming tape, overall thickness 0.065 inch (1.6 mm) nominal; TPO self adhering flashing.

F. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer.

G. Seam Plates: Steel with barbs and Galvalume coating; corrosion-resistance complying with FM 4470.

H. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches (33 mm) wide by 0.10 inch (2.5 mm) thick; Termination Bar.

I. Cut Edge Sealant: Synthetic rubber-based, for use where membrane reinforcement is exposed; TPO Cut Edge Sealant by Manufacturers'.

J. General Purpose Sealant: EPDM-based, one part, white general purpose sealant; TPO General Purpose Sealant.

K. Molded Flashing Accessories: Unreinforced TPO membrane pre-molded to suit a variety of flashing details, including pipe boots, inside corners, outside corners, etc.; TPO Small and Large Pipe Flashing.

L. Roof Walkway Pads: Non-reinforced TPO walkway pads, 0.130 inch (3 mm) by 30 inches (760 mm) by 40 feet long with patterned traffic bearing surface; TPO Walkway Pads. Contractor is to include 50 linear feet for bidding purposes.

2.04 ROOF INSULATION AND COVER BOARDS

A. Fire Barrier Board
   1. ½" base glass faced gypsum fire barrier board
   2. Thickness: 1/2 inch.
   3. Width: 4 feet.
   4. Length: 4 feet
   5. Weight: 2.0 lb/sq. ft.
      a. Compressive Strength (Applicable Sections of ASTM C472): Nominal 900 pounds per square inch.
   6. R-Value (ASTM C518): 0.56

B. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C 1289 Type II Class 1, with the following additional characteristics:
   1. Thickness: 1.5"
   2. Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal.
      a. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
   3. R-Value (LTTR): 1.5 inch (25 mm) Thickness: 5.7 R, minimum.
   4. Compressive Strength: 20 psi (138 kPa) when tested in accordance with ASTM C 1289.
   5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
   6. Recycled Content: 19 percent post-consumer and 15 percent post-industrial, average.

7. Acceptable Product: Flat and/or Tapered polyiso board insulation

C. High Density Polyisocyanurate Cover Board: Non-combustible, water resistant high density, closed cell polyisocyanurate core with coated glass mat facers, complying with ASTM D 1623, and with the following additional characteristics:
   1. Size: 48 inches by 48 inches nominal.
      a. Exception: Board to be attached using adhesive or asphalt may be no larger than 48 inches by 48 inches, nominal.
   2. Thickness: 0.5 inch
   3. R-Value: 2.5 based on ASTM tests C158 and C177.
   4. Surface Water Absorption: <3%, maximum, when tested in accordance with ASTM C 209.
   5. Compressive Strength: 120psi, when tested in accordance with ASTM 1621.
   6. Density: 5pcf, when tested in accordance with ASTM 1622.
   7. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
   8. Mold Growth Resistance: Passed, when tested in accordance with ASTM D 3273.

D. Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

2.05 METAL ACCESSORIES - (AS NEEDED)

A. Metal Roof Edging and Fascia: Continuous metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer.
   1. Wind Performance:
      a. Membrane Pull-Off Resistance: 100 lbs/ft (1460 N/m), minimum, when tested in accordance with ANSI/SPRI ES-1 Test Method RE-1, current edition.
      b. Fascia Pull-Off Resistance: At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-2, current edition.
      c. Provide product listed in current Factory Mutual Research Corporation Approval Guide with at least FM 1-270 rating.
   2. Description: Two-piece; 45 degree sloped galvanized steel sheet edge member securing top and bottom edges of formed metal fascia.
   3. Fascia Face Height: 5 inches
   4. Edge Member Height Above Nailer: 1-1/4 inches
   5. Length: 144 inches
   6. Functional Characteristics: Fascia retainer supports while allowing for free thermal cycling of fascia.
   7. Aluminum Bar: Continuous 6063-T6 alloy aluminum extrusion with pre-punched slotted holes; miters welded; injection molded EPDM splices to allow thermal expansion.
   8. Anchor Bar Cleat: 20 gage, 0.036 inch G90 coated commercial type galvanized steel with pre-punched holes.
   9. Fasteners: Factory-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.
   10. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, scuppers, and end caps; minimum 14 inch long legs on corner pieces.
   11. Scuppers: Welded watertight.
   12. Accessories: Provide matching brick wall cap, downspout, extenders, and other special fabrications as shown on the drawings.

B. Parapet Copings: Formed metal coping with galvanized steel anchor/support cleats for capping any parapet wall; watertight, maintenance free, without exposed fasteners; butt type joints with concealed splice plates; mechanically fastened as indicated.
   1. Wind Performance:

a. At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-3, current edition.
b. Provide product listed in current Factory Mutual Research Corporation Approval Guide with at least FM 1-90 rating.

2. Description: Coping sections allowed to expand and contract freely while locked in place on anchor cleats by mechanical pressure from hardened stainless steel springs factory attached to anchor cleats; 8 inch wide splice plates with factory applied dual non-curing sealant strips capable of providing watertight seal.
3. Material and Finish: 24 gage, 0.024 inch thick galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
4. Dimensions:
   a. Wall Width: As indicated on the drawings.
   b. Piece Length: Minimum 144 inches
   c. Curved Application: Factory fabricated in true radius.
5. Anchor/Support Cleats: 20 gage, 0.036 inch thick prepunched galvanized cleat with 12 inch wide stainless steel spring mechanically locked to cleat at 72 inches on center.
6. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, corners, intersections, curves, pier caps, and end caps; minimum 14 inch long legs on corner, intersection, and end pieces.
7. Fasteners: Factory-furnished; electrolytically compatible; minimum pull out resistance of 240 pounds for actual substrate used; no exposed fasteners.

2.06 ACCESSORY MATERIALS - (AS NEEDED)

A. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
   1. Width: 3-1/2 inches (90 mm), nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to it.
   2. Thickness: Same as thickness of roof insulation.

B. Retrofit Roof Drains
   1. Drain Body: 0.050 inch (1.3mm) thick spun 1100 aluminum alloy, 17-1/2 inch (445mm) diameter one piece flange and 12 inch (305mm) long tapered drain stem with compression seal, sized for sealing tight to inside of existing drainage pipe.
   2. Compression Seal: Elastomeric compression seal held with compression ring and stainless steel screws.
   3. Strainer: to match roof drain body
   4. Outlet Size: to fit the existing roof drain piping

PART 3 INSTALLATION

3.01 GENERAL

A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.

B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.

C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.

D. Perform work using competent and properly equipped personnel.

E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.

F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F (15 to 25 degrees C).

G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
   1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
   2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
   3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.

H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.

I. Consult membrane manufacturer's instructions, container labels, and Safety Data Sheets (SDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

J. Contractor is to perform a 20 minute water flow test on each roof drain to confirm the piping is clear and open for drainage. Documentation of time duration, approx. water pressure, and status of drain flow is to be collected and provided to DGS prior to the commencement of any work on site.

3.02 EXAMINATION

A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.

B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.

C. Examine roof substrate to verify that it is properly sloped to drains.

D. Verify that all roof drains are free and clear to drain.

E. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

3.03 PREPARATION

A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.

B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.

C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch (6 mm) wide with fill material acceptable insulation to membrane manufacturer.

D. Seal, grout, or tape deck joints, where needed, to prevent seepage of foreign materials into building.

3.04 INSULATION AND COVER BOARD INSTALLATION

A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.

B. Install insulation in a manner that will not compromise the vapor retarder integrity.

C. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.

D. Lay roof insulation in courses parallel to roof edges.

E. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch . Install cut pieces of insulation in a dimension not less than 8” in any direction. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch (6 mm).

F. Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through insulation into deck to depth and in pattern required by Factory Mutual for FM Class specified in PART 2 and membrane manufacturer, whichever is more stringent.

3.05 SINGLE-PLY MEMBRANE INSTALLATION

A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.

B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.

C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.

D. Install membrane totally adhered to the substrate using approved adhesive, fasteners, and edge securement as specified and as required by membrane manufacturers.

E. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches (1:6) using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
   1. Exceptions: Round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inches square.

F. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

3.06 FLASHING AND ACCESSORIES INSTALLATION

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.

B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
   1. Follow roofing manufacturer's instructions.
   2. Remove protective plastic surface film immediately before installation.
   3. Install water block sealant under the membrane anchorage leg.
   4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
   5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
   6. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
   7. When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.

C. Scuppers: Set in sealant and secure to structure; flash as recommended by manufacturer.

D. Roofing Expansion Joints: Install as shown on drawings and as recommended by roofing manufacturer.

E. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8 inches (200 mm) high above membrane surface.
   1. Use the longest practical flashing pieces.

2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
3. Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
4. Provide termination directly to the vertical substrate as shown on roof drawings.

F. Roof Drains: (use approved insert drains)

G. Roof Drain System: Install roof drain and accessories in strict accordance with manufacturer's written instructions, providing a permanent weather tight installation.
1. Preparation: Remove existing strainer dome, clamping ring, and other components as required to enable retrofit drain flange to lie flush with roof membrane. Remove debris and constricting material built up on the interior of the existing drain pipe that interferes with proper installation and sealing of compression seal. All surfaces shall be smooth, dry, clean, free of sharp edges, and other irregularities.
2. Insert drain body down into existing drain pipe until flange is flush with roof membrane, seating flange in membrane compatible mastic. Tighten seal compression ring.

H. Flash flange into roof system per roof system and roof drain manufacturer requirements.

I. Securely attach clamping ring and strainer basket.

J. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.

K. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.

L. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches deep, with at least 1 inch clearance from penetration, sloped to shed water.

M. Structural Steel Tubing: If corner radii are greater than 1/4 inch and longest side of tube does not exceed 12 inches flash as for pipes; otherwise, provide a standard curb with flashing.

3.07 FINISHING AND WALKWAY INSTALLATION - (50 LINEAR FEET)

A. Install walkways at access points to the roof, around rooftop equipment that may require maintenance, and where indicated on the drawings.

B. Walkway Pads: Adhere to the roofing membrane, spacing each pad at minimum of 1.0 inch (25 mm) and maximum of 3.0 inches (75 mm) from each other to allow for drainage.
1. If installation of walkway pads over field fabricated splices or within 6 inches (150 mm) of a splice edge cannot be avoided, adhere another layer of flashing over the splice and extending beyond the walkway pad a minimum of 6 inches (150 mm) on either side.
2. Prime the membrane, remove the release paper on the pad, press in place, and walk on pad to ensure proper adhesion.

3.08 FIELD QUALITY CONTROL

A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).

B. Perform all corrections necessary for issuance of warranty.

3.09 CLEANING

A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.

B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.

C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.10 PROTECTION

A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION 07 5423

SECTION 07 5610
PMMA (POLYMETHYL METHACRYLATE) FLUID-APPLIED ROOFING - ENGINE 5

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid-Applied standing seam metal roof panel repairs.

B. Adhered cold fluid-applied reinforced (PMMA) polymethyl methacrylate waterproofing

C. system including, membrane, penetration flashings, base flashings, and expansion joints.

D. Substrate preparation, cleaning, leveling and patching

E. Temporary waterproofing

F. Waterproofing membrane installation

G. Accessories.

1.02 SYSTEM DESCRIPTION

A. All membrane materials to be installed to cover the existing copper hidden gutter shall have a superior coefficient of expansion, to allow for differential movement between the horizontal and vertical surface of the flashed penetration or projection.

B. New membrane system MUST provide fast-drying primers to allow substrate preparation, priming and membrane application to be completed the same day.

C. The use of cold fluid-applied reinforced (PMMA) polymethyl methacrylate membrane materials will be required for all gutter coating restorations.

1.03 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing and Trim - Engine 4, 5, 8, 20 &24: Metal parapet covers, copings, and counterflashings.

B. Section 076201 - Restoration of Copper Sheetmetal Fascia & Roof Flashing

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM) C 836 Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane.

B. Forschungsgesellschaft Landschaftsentiwicklung Landschaftsbau (FLL), Guidelines for the Planning, Execution and Upkeep of Green Roof Sites (2002).

C. Dow Chemical Company, TechNote 508 “Ballast Design Guide for IRMA Roofs”.

D. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.

E. ACI-308 - Recommended Practice for Curing Concrete

F. ASTM - D638 - Test Methods for Tensile Properties of Plastics

G. ASTM - D4258 - Standard Practice for Surface Cleaning Concrete for Coatings

H. ASTM - D4259 - Standard Practice for Abrading Concrete

I. ASTM - D4541 - Method for Pull-Off Strength of Coatings using Portable Adhesion Tester

J. ASTM - E96(A) - Test Methods of Moisture Transmission of Material

K. ASTM E-108, ANSI/UL 790 for fire resistance.

L. Steel Structures Painting Council (SSPC)

M. CRRC-1 - Standard; Cool Roofs Rating Council 2017.

1.05 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements, for submittal procedures.

B. Membrane System Product Data: Provide current standard printed product literature indicating characteristics of membrane materials, flashing materials, components, and accessories product specification and installation.

C. Product Samples: Submit product samples of membrane and flashing materials showing color, texture, thickness and surfacing representative of the proposed system for review and approval by the Owner's Representative.

D. Submit sample copies of both the Manufacturer and Applicator warranties for the periods stipulated. Each specimen must be a preprinted representative sample of the issuing company's standard warranty for the system specified.

E. Submit copies of current Material Safety Data Sheets (MSDS) for all components of the work.

F. Membrane Shop Drawings: Submit shop drawings of cold fluid-applied reinforced polymethyl methacrylate membrane showing all a project plan, size, flashing details, and attachment for review and approval by the Owner's Representative and Membrane Manufacturer.

G. Product Data: Provide manufacturer's data for membrane and accessory materials.

H. Field Quality Control Test Report.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture of fluid-applied roofing or waterproofing systems.

B. Membrane Manufacturer: Company specializing in manufacturing the products specified in this section with ten (10) years documented experience. Membrane Manufacturer shall submit the following certifications for review:
   1. Substrates and conditions are acceptable for purpose of providing specified warranty.
      a. Materials supplied shall meet the specified requirements.
   2. Applicator: Company specializing in performing the work of this section with (3) years documented experience and approved by system manufacturer for warranted membrane installation. Applicator shall submit the following certification for review:
      a. Applicator shall submit documentation from the membrane manufacturer to verify contractor's status as an approved applicator for warranted installations.
   3. Evaluate moisture content of substrate materials. Constructor shall determine substrate moisture content throughout the work and record with Daily Inspection Reports or other form of reporting acceptable to the Owner or designated Representative, and Membrane Manufacturer.

C. Random tests to determine tensile bond strength of membrane to substrate shall be conducted by the Contractor at the job site using an Elcometer Adhesion Tester Model 106 or similar device. Contractor shall perform tests at the beginning of the Work, and at intervals as required to assure specified adhesion with a minimum of three (3) tests per 5000 square feet. Smaller areas shall receive a minimum of three (3) tests. Test results shall be submitted to the
   1. Owner or his designated Representative and the Membrane Manufacturer. Contractor shall immediately notify the Owner or his designated Representative and Membrane Manufacturer in the event tensile bond test results are below specified values.
      a. Adequate surface preparation will be indicated by tensile bond strength of membrane to substrate greater than or equal to 220 psi (1.5 N/mm2) for pedestrian traffic and 300 psi (2.0 n/mm2) for vehicular (low speed) traffic and water flow/containment.
      b. In the event the tensile bond strengths are lower than the minimum specified, additional substrate preparation is required. Repeat testing to verify suitability of substrate preparation.

D. Monitor quantities of installed materials. Monitor application of resin mixture, reinforcing fleece and flashing. Perform Work in accordance with manufacturer's instructions.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable building and jurisdictional codes for roofing/waterproofing assembly and fire resistance requirements.

B. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.

C. Comply with authority or agency “Confined Space Policy” during and throughout all work to be performed.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact.

B. Store materials in weather protected environment, clear of ground and moisture.

C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

D. The Contractor together with the Owner or his designated Representative shall define a storage area for all components. The area shall be cool, dry, out of direct sunlight, and in accordance with manufacturer‘s recommendations and relevant regulatory agencies. Materials shall not be stored in quantities that will exceed design loads, damage substrate materials, hinder installation or drainage.

1. Store solvent-bearing solutions, resins, additives, inhibitors or adhesives in accordance with the MSDS and/or local fire authority. After partial use of materials replace lids promptly and tightly to prevent contamination.
2. Roll goods shall be stored horizontally on platforms sufficiently elevated to prevent contact with water and other contaminants. DO NOT use rolls which are wet, dirty or have damaged ends.

E. Roofing/waterproofing materials must be kept dry at all times. If stored outside, raise materials above ground or roof level on pallets and cover with a tarpaulin or other waterproof material. Plastic wrapping installed at the factory should not be used as outside storage covers.

F. Follow manufacturer's directions for protection of materials prior to and during installation. Do not use materials which have been damaged to the point that they will not perform as specified. Fleece reinforcing materials must be clean, dry and free of all contaminants.

G. Copies of all current MSDS for all components shall be kept on site. Provide any and all crewmembers with appropriate safety data information and training as it relates to the specific chemical compound he or she may be expected to deal with. Each crewmember shall be fully aware of first-aid measures to be undertaken in case of incidents. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Do not apply roofing/waterproofing membrane during or with the threat of inclement weather.

B. Application of cold fluid-applied reinforced polymethyl methacrylate roofing/waterproofing membrane may proceed while air temperature is between 23 °F and 95 °F (-5 - 35 °C) providing the substrate is a minimum of 5 °F above the dew point.

C. When ambient temperatures are at or expected to fall below 23 °F (-5 °C) or reach 95 °F (35 °C) or higher, follow Membrane System Manufacturer's recommendations for weather related restrictions and application procedures.

D. Ensure that substrate materials are dry and free of contaminants. DO NOT commence with the application unless substrate conditions are suitable. Contractor shall demonstrate that substrate conditions are suitable for the application of the materials.

E. Where required by the Owner or his designated Representative, Contractor shall implement odor control and elimination measures prior to and during the application of the roofing/waterproofing materials. Control/elimination measures shall be field tested at off- hours and typically consists of one (1) or a multiple of the following measures:

1. Sealing of air intakes with activated carbon filters. Install filters in accordance with requirements and recommendations of the filter manufacturer. Seal filters at joints and against building exterior walls to prevent leakage of unfiltered air where required due to size of intake opening. Provide track system to secure filters.
2. Erection and use of moveable enclosure(s) sized to accommodate work area(s) and stationary enclosure for resin mixing station. Enclosure shall be field constructed or pre-manufactured of fire retardant materials in compliance with local code requirements in accordance with requirements of the Owner or his designated Representative. Equipment enclosure(s) with mechanical air intake/ exhaust openings and Odor Control Air Cleaners, as required to clean enclosed air volume and to prevent odor migration outside the enclosure. Exhaust opening shall be sealed with activated carbon filter.
3. Placement of odor elimination stations inside and outside of the enclosure(s) as required by field condition, in coordination with the Owner or his designated Representative.
4. Protection of Contractor personnel and occupants of the structure and surrounding buildings as necessary to comply with requirements of OSHA, NIOSH and/or governing local authority.
5. When disposing of all refuse or unused materials, observe all EPA, OSHA or local disposal requirements.

1.10 COORDINATION & PROTECTION

A. Coordinate the work with the installation of associated metal flashings, accessories, appurtenances, etc. as the work of this section proceeds.

B. Building components shall be protected adequately (with tarp or other suitable material) from soil, stains, or spills at all hoisting points and areas of application. Contractor shall be responsible for preventing damage from any operation under its Contract. Any such damage shall be repaired at Contractor's expense to Owner's satisfaction or be restored to original condition.

C. Provide barricades, retaining ropes, safety elements (active/passive) and any appropriate signage required by OSHA, NIOSH, and NSC and/or the Owner or designated Representative.

D. Protect finished roofing/waterproofing membrane from damage by other trades. Do not allow waste products containing petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc. or direct steam venting to come into direct contact with the membrane. Contact membrane manufacturer for further exposure limitation and restrictions.

1.11 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application and until cured.

B. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.12 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. A. Manufacturer's Total System Premier Warranty: Provide Twenty (20) Year manufacturer's waterproofing warranty under provisions of this section. This waterproofing warranty provides for cost of labor and materials for loss of watertightness, limited to amounts necessary to effect repairs necessitated by either defective material or defects in related installation workmanship, with no dollar limitation (“NDL”). The warranty shall also include the insulation, garden roof components, pavers and pedestals when they are supplied or approved by membrane manufacturer and installed in accordance with membrane manufacturer general installation guidelines.

C. Waterproofing Contractor's Warranty: Provide Five (5) year "Applicator Maintenance Warranty" covering workmanship for all work of this section including installation of membrane, flashings, metal work, and roofing/waterproofing accessories.

D. Submit (2) executed copies of both the manufacturer and applicator warranties for the periods stipulated, starting from the date of substantial completion. Each warranty must be signed by an authorized representative of the issuing company.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fluid-Applied Roofing:

1. Basis of Design:
    1. The products herein specified are totally pre-engineered products of the listed manufacturer and establish criteria for the approval of substitutions. Products must be part of a pre- engineered system, equivalent in function, quality, composition and method of application to be considered for approval as an "Approved Substitute."
        a. Alsan RS System by Soprema, Inc., Wadsworth, OH
        b. Siplast - Parapro
    2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

I. PHYSICAL PROPERTIES

A. Membrane: Two-component, with catalyst, cold fluid-applied reinforced (PMMA) polymethyl methacrylate waterproofing membrane with a 360 degree needle punched non-woven

B.	**Property**	**Value**	**Test Method**
C.	Pebble Gray -		
D.	Physical state	(Liquid) Cures to solid -	
E.	Nominal thickness (with Fleece) (Sect. 5)	115 mils	ASTM D5147
F.	Elongation @ peak load, avg. 55% (dumbbell)		ASTM D412
G.	Peak load @ 73°F, avg. (dumbbell)	809 lbf/in2 (809 kN/m2	ASTM D412
H.	Tear strength (Sect. 7)	107 lbf (0.5 kN)	ASTM D5147
I.	Shore A hardness,	avg.81	ASTM D2240
J.	Water absorpt.,(Method I)(24h @ 73°F)	0.41%	ASTM D570
K.	Water absorpt.,(Method I)(48h @ 122°F)	1.57%	ASTM D570
L.	Low temperature flexibility (Sect.11)	-13°F (-25°C)	ASTM D5147
M.	Dimensional stability (max. movement) (Sect.10)	-0.063%	ASTM D5147
N.	Usage time*	15-20 minutes	
O.	Rainproof after*	30 minutes	
P.	Solid to walk on after*	60 minutes -	
Q.	Solid to drive on with air rubber tires	*3 hours -	
R.	Overburden may be applied after	3 hours -	
S.	Completely hardened after	3 hours -	
T.	Crack spanning	2mm / 0.08 inch	
U.	Resistance to temp. up to (short term)	250°C/482°F	

V. *All times are approximate and depend upon wind, humidity and temperature.

2.03 ACCESSORIES

A. FLASHINGS
   1. Membrane Flashings: Two-component, with catalyst, cold fluid-applied reinforced (PMMA) polymethyl methacrylate flashing/vertical grade waterproofing membrane with a 360 degree needle punched non-woven 110 g/m2 polyester reinforcing fleece, for a finished dry film membrane thickness of .115 inch nominal per ply; conforming to ASTM C 836. Provide products manufactured and supplied by the following:
      a. Soprema System's Alsan RS 230 Flash resin for use in an adhered waterproofing system.

B. Polymethyl Methacrylate Primer: Two-component, high solids polymethyl methacrylate resin for use in improving adhesion of membrane to wood, asphalt and concrete substrate surfaces. Monitor application rate and adjust depending on substrate absorbency:
   1. Soprema System's Alsan RS 276 Primer resin for use in an adhered waterproofing system applied over cementitious/masonry and wood substrates.
   2. Soprema System's Alsan RS 222 Primer resin for use in an adhered waterproofing system applied over asphalt surfaces.

C. Epoxy Primer (Protection from Substrate Wetness): Two-component, solvent-free, 100% solids, epoxy resin for use in improving adhesion of membrane to cementitious/masonry substrate surfaces. Monitor application rate and adjust depending on substrate absorbency.

D. Reinforcement Fleece: A 360 degree needle punched non-woven 110 g/m2 polyester reinforcing fleece used to improve tear strength, puncture resistance, flexural fatigue and crack bridging capabilities while maintaining membrane uniformity:
   1. Soprema's Alsan RS Fleece reinforcement fabric for use in an adhered waterproofing system.

E. Surface Leveling/Pitching Mortar Resin: Multi component, high solids polymethyl methacrylate mortar resin mix for use in leveling, pitching and smoothing deck substrate surfaces:
   1. Soprema System's Alsan RS 233 Self-Leveling Mortar resin for use in an adhered waterproofing system.

F. Patching, Filling and Smoothing Resin: Two-component, high solids polymethyl methacrylate paste resin for use in filling surface cracks, voids and depressions and for smoothing/leveling surfaces prior to application of membrane system:
   1. Soprema System's Alsan RS Paste resin for use in an adhered waterproofing system.

G. Tools, Accessories, and Cleaners: Supplied and/or approved by membrane manufacturer for product installation.

H. Catalyst/Curing Agent: White granular powder, based on dibenzoylperoxide, used as a reactive agent to induce curing of all polymethyl methacrylate resins:
   1. Soprema's Alsan RS Catalyst Powder for use with all regular-odor polymethyl methacrylate resins.

I. Leveling and Patching Aggregate: Silica sand shall be washed, kiln-dried, and dust-free, suitable for troweling or pourable self-leveling, round grain or angular with the following size specification:
   1. For voids less than ¼" in depth: 0.4 - 0.8 mm
   2. For voids ¼" to 2" in depth: 0.7 - 1.2 mm
      a. Mixing Proportions shall be a ratio of resin to sand at 1:2 by volume or as approved by membrane manufacturer.

J. Miscellaneous Fasteners: Appropriate for purpose intended and approved by membrane system manufacturer; length required for thickness of material [with metal washers]; as supplied by membrane manufacturer.

K. Caulking: Single component, non-sag elastomeric polyurethane sealant, as recommended or supplied by membrane manufacturer for use in making airtight and watertight seals where required.

L. Adhesive/Sealants: Single component SBS-based sealant compound as recommended by membrane manufacturer for use in adhering certain geotextile seam overlaps:
   1. Soprema Sopramastic sealant compound.

M. Flexible Flashing Sheet: Neoprene or other elastic type sheets approved by roofing membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to starting this work.

B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of roofing system.

C. Verify that substrate surfaces are smooth, free of honeycombs or pitting, and not detrimental to full contact bond of roofing materials.

3.02 PREPARATION

A. Clean and prepare surfaces to receive roofing in accordance with manufacturer's instructions and recommendations.

B. The contractor shall determine the condition of the existing structural deck/substrate. All defects in the deck or substrate shall be corrected before new waterproofing work commences. Areas of deteriorated deck/substrate, porous or other affected materials must be removed and replaced with new to match existing.

C. Existing copper surface must be wire brushed to a bright copper condition

D. Prepare flashing substrates as required for application of new waterproofing membrane flashings.

E. Inspect substrates, and correct defects before application of new waterproofing. Fill all surface voids greater than 1/8 inch wide with an acceptable fill material.

F. Remove all ponded water, snow, frost and/or ice from the work substrate prior to installing new waterproofing materials.

G. The final substrate for waterproofing shall be clean, dry, free of loose, spalled or weak material including coatings, mineral aggregate, and flood coat/gravel surfacing, oil, grease, contaminants, abrupt changes in level, waterproofing agents, curing compounds, and free of projections which could damage membrane materials.

H. Steel/Metal:
   1. Clean and prepare metal surfaces to near white metal in accordance with SSPC - SP3 (power tool clean) or as required by membrane manufacturer. Extend preparation a minimum of three (3) inches beyond the termination of the membrane flashing materials. Notch steel surfaces to provide a rust-stop.
   2. Stainless steel (series 400, 300) shall be abraded to provide a rough open surface.

I. Other Flashing Surfaces:
   1. Remove all contaminants as required by membrane manufacturer. Surface preparation shall be performed by means approved by Owner or his designated Representative.

J. Finish Leveling, Patching and Crack Preparation:
   1. General: Resin/sand mix is the preferred material for all substrate finish leveling, crack and wall/deck preparation and patching. Resin/sand patching mix provides a fast-set time of approximately 30 minutes and does not require surface grinding.
   2. Primer/sand mix is an alternative substrate leveling and patching material over horizontal surfaces. Primer/sand patching mix provides a set time of approximately 30 minutes, and does not require surface grinding. Primer/sand mix is typically applied in conjunction with general surface priming.

3. Substrate Leveling & Patching: Substrate conditions are to be evaluated by the Contractor, the Owner, or his designated Representative, and Membrane manufacturer. Perform leveling and patching operations as follows:
    a. Level uneven horizontal and low-slope surfaces with a leveling mixture of (PMMA) polymethyl methacrylate Alsan RS 233 Self-Leveling Mortar [depth < ½“, (12mm)] resin. Depths < ½“ should be build up in separate layers. Spread and plane this resin with a squeegee, trowel and/or roller to achieve a flat surface. Spike roller may be used to smooth out the surfaces.
    b. Fill cavities on horizontal and low-slope surfaces with a patching mixture of (PMMA) polymethyl methacrylate primer and approved kiln-dried sand in a 1:3 primer to sand ratio by volume or with (PMMA) polymethyl methacrylate Alsan RS Paste using trowels to apply the resin mortar in place and achieve flat surface.
    c. Fill cavities on sloped and vertical surfaces with (PMMA) polymethyl methacrylate Alsan RS Paste using trowels to apply the resin mortar in place and achieve flat surface.
    d. Silica sand must be kept absolutely dry during storage and handling.
    e. Any surface to be leveled or filled must first be primed with an appropriate (PMMA) polymethyl methacrylate primer and all Alsan RS resin mortars shall be placed in lifts no greater than the maximum thickness indicated by the manufacturer.

K. Joint and Crack Preparation:
    1. Joints, cracks and fractures in the structural deck/substrate shall be prepared as defined below prior to installation of the waterproofing membrane. Note: Joints, cracks, and fractures may telegraph through the waterproofing membrane.
    2. Non-Moving Cracks: Determine that crack is non-moving. Clean out crack by brushing and oil-free compressed air. Fill crack with (PMMA) polymethyl methacrylate Alsan RS Paste. Allow for a minimum of one (1) hour cure or as required by product manufacturer.
    3. Moving Cracks: Determine that crack is moving. Clean out crack by brushing and oil-free compressed air. Fill crack with (PMMA) polymethyl methacrylate Alsan RS Paste. Allow for a minimum of one (1) hour cure or as required by product manufacturer. Apply resin and 4 inch (10 cm) wide strip of membrane (resin and fleece) in strict accordance with Membrane manufacturer’s written instructions

3.03 WOOD NAILER LOCATION AND INSTALLATION

A. Install pressure-treated wood nailers as specified, or as required by the Membrane manufacturer.

3.04 SECURE WOOD NAILER:

A. Wood nailers shall be firmly fastened to the deck. The wood nailer attachment must be able to resist a minimum force of 200 lbs. Per lineal foot, in any direction. Mechanically fasten wood nailers as required to resist a force of 200 lbs. per lineal foot, but with no less than 5 fasteners per 8 foot or 6 fasteners per 10-foot length of nailer. Refer to current FM loss prevention bulletin 1-49 for additional attachment recommendations

3.05 PLUMBING / WATER LINE INSTALLATION

A. A permanent line should be installed for the connection of an irrigation system (if required, e.g. the integral 2’ o.c. drip tape in capillary mat) and frost-resistant taps located for the connection of garden hose for routine maintenance and/or manual watering of the green roof during periods of extraordinarily dry weather (if irrigation is not installed).

3.06 PRIMER APPLICATION

A. General:
    1. Mix and apply two-component primer in strict accordance with written instructions of Membrane Manufacturer. Use only proprietary materials, as supplied by the membrane manufacturer.

a. The substrate surface must be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth wipe or a combination of methods.
b. Do not install primer on any substrate containing newly applied and/or active asphalt, coal-tar pitch, creosote or penta-based materials unless approved in writing by Membrane Manufacturer. Some substrates may require additional preparation before applying primer.

B. Mixing of Polymethyl Methacrylate Primer:
1. Premix polymethyl methacrylate primer thoroughly with a spiral agitator or stir stick. Add pre-measured catalyst amount into mixed primer container and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. The primer solution should be a uniform color, with no light or dark streaks present.
2. Do not thin primer. Determine required primer coverage for each substrate material/condition and apply in strict accordance with written instructions of Membrane Manufacturer.
3. Mix only that amount of primer that can be used within 15 minutes.

C. Mixing of Two-Component Epoxy Primer:
1. Mix A and B components together with a spiral agitator or stir stick. Use slow speed. DO NOT AERATE. The primer solution should be a uniform color, with no light or dark streaks present.
2. Do not thin primer. Determine required primer coverage for each substrate material / condition and apply in strict accordance with written instructions of Membrane Manufacturer.
3. Mix only that amount of primer that can be used within 15 minutes.

D. Application of Primer:
1. Apply primer in accordance with manufacturer's written instructions and details.
2. Roll or brush the primer evenly onto the surface to fully saturate the substrate in one application. Do not allow primer to pond or collect in low areas.
3. Apply primer only up to the edge of the membrane flashing terminations. Primer application past the membrane terminations requires surfacing with an approved material.
4. For polymethyl methacrylate primer applications over cementitious substrates where protection from substrate wetness is required, apply primer coat at a heavier application rate until pore saturation is achieved.
5. For epoxy based primer applications, apply kiln-dried sand into the final coat of primer while still wet at the rate of 30 lbs. per 100 square feet (1.5 kg/m^2). Use quartz size # 0 (0.4 – 0.8 mm).
6. Allow polymethyl methacrylate primers to cure for a minimum of thirty (30) minutes before membrane application. Allow epoxy-based quick-dry primers to cure for a minimum of two (2) hours before membrane application. Membrane must be applied to primer only when completely dry and without tack.
7. Premature exposure to moisture may require removal and application of new primer. DO NOT apply new primer over exposed primer older than six (6) months, primer prematurely exposed to moisture, or primer used as temporary waterproofing, unless approved in writing by the Membrane Manufacturer.

E. Disposal of Primer:
1. Cured primer may be disposed of in standard landfills. This is accomplished by thoroughly mixing all components.
2. Uncured primer is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not through uncured resin away.

3.07 MEMBRANE APPLICATION

A. General:

1. Mix and apply cold fluid-applied reinforced polymethyl methacrylate waterproofing membrane in strict accordance with written instructions of Membrane Manufacturer. Use only proprietary membrane resins and materials, as supplied by the membrane manufacturer.
2. The primed substrate surface shall be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth-wipe or a combination.
3. Protect all areas where membrane has been installed. Do not work off installed membrane during application of remaining work before three (2) hours of curing. Movement of materials and equipment across installed membrane is not acceptable. If movement is necessary, provide complete protection of affected areas.
4. Closely follow the Membrane Manufacturer's recommendation for hot and cold weather application. Monitor surface and ambient temperatures, including the effects of wind chill.

B. Mixing of Resin:
1. Mix resin with a spiral agitator for a minimum of 2 minutes until the liquid has a uniform color.
2. Add the pre-measured Catalyst Powder to resin and mix with the same agitator for 2 minutes or until the powder is completely mixed. The catalyst is completely dissolved when there are no white specs remaining.

C. Application of Resin/Fleece
1. Apply mixed resin to the prepared surface in accordance with manufacturer’s written instructions and details. The resin should be rolled or brushed liberally and evenly onto the surface using a broad, even stroke. Cover one working area at a time, between 15 – 20 ft.2 (1.4 – 1.9 m2).
2. Roll out dry polyester fleece onto the liquid resin mix, making sure the SMOOTH SIDE IS FACING UP (natural unrolling procedure), avoiding any folds and wrinkles. The fleece will begin to rapidly saturate with the liquid resin mix. Use a medium nap roller or brush to work the resin into the fleece, saturating from the bottom up, and eliminating air bubbles, wrinkles, etc. The appearance of the saturated fleece should be light opaque amber with no white spots. White spots are indications of unsaturated fleece or lack of adhesion. It is important to correct these faults before the resin cures.
3. Apply additional liquid resin mix on top of fleece in accordance with manufacturer’s written instructions and details to finish the saturation of the fleece. Roll this final coating into the fleece, which will result in a glossy appearance. The fleece can only hold so much resin and all excess should be rolled forward to the unsaturated fleece, eliminating ponding or excessive build-up of the resin. Any excess resin left on the top of the fleece will weather and peel off. The correct amount of resin will leave no whiteness in fleece and there will be a slightly fibrous surface texture. The final resin coating should be smooth and uniform.

D. Prevent contact between mixed/unmixed resin and new/existing membrane. If any unmixed resin contacts membrane surface remove immediately and clean thoroughly with a cloth rag

3.08 INSTALLATION

A. Install fluid-applied roofing in accordance with manufacturer's instructions and recommendations, to specified minimum thickness.

B. Apply primer or surface conditioner at a rate recommended by manufacturer, and protect surface conditioner from rain or frost until dry.

C. Joint Cover Assembly: Install at expansion joints, moving joints 1/2 inch (12.7 mm) wide or wider, and joints between horizontal and vertical surfaces.
1. Use flexible flashing sheet wide enough to extend 6 inches (152 mm) on both sides of joint with a loop of sheet extended down into the joint to a depth at least the width of the joint.
2. Embed sheet in one coat of fluid-applied roofing material.
3. Before installing the remainder of the roofing material, install a compressible joint sealer backer rod into joint above loop to prevent roofing material from filling loop.

D. Applying to Vertical Surfaces: Extend fluid-applied roofing material at least 6 inches (152 mm) above horizontal roofing surfaces.

E. Roof Drains: Unless otherwise recommended by roofing manufacturer, set drain flange in one coating of roofing material and extend a full thickness of roofing material onto drain clamp flange, with adequate coating of roofing material to ensure waterproof seal of clamp ring.

F. Apply extra thickness of roofing material at corners, intersections, and angles, when recommended by roofing manufacturer.

G. When using as a repair method on existing metal roof panels, paint finished product to match roof panels.

3.09 FIELD QUALITY CONTROL

A. Owner will provide testing services in accordance with Section 01 4000 - Quality Requirements, and Contractor shall provide temporary construction and materials for testing.

B. Upon completion of horizontal fluid-applied roofing material installation, install dam at perimeter of installation area in preparation for flood testing.

C. Flood area to a minimum depth of 1 inch (25.4 mm) with clean water, and after 72 hours, inspect for leaks.

D. If leaking is found, remove water, repair leaking areas with new roofing materials as directed by Designer, and repeat flood test. Repair damages to building related to roof test leakage.

E. When area is confirmed to be watertight, drain water and remove dam materials.

3.10 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must proceed over installed roofing materials, protect surfaces using durable materials acceptable to roofing material manufacturer.

END OF SECTION 07 5610

SECTION 07 6200
SHEET METAL FLASHING AND TRIM - ENGINE 4, 5, 8, 20 &24

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including metal edge and flashings.

B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

A. Section 06 1010 - Rough Carpentry - Wood Nailers for sheet metal work

B. Section 07 7100 - Roof Specialties - Pre-Manufactured Warranted Edge Metal - Engine 4, 5 & 24:

C. Section 07 9200 - Joint Sealants - Engine 4, 5, 8, 20 & 24: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

C. ASTM B32 - Standard Specification for Solder Metal 2020.

D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

F. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

G. ASTM International (ASTM)

H. ASTM B 117 - Practice for Operating Salt Spray (Fog) Apparatus.

I. ASTM B 244 - Standard Test Method for Measurement of Thickness of Anodic. Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.

J. ASTM D 523 - Standard Test Method for Specular Gloss.

K. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.

L. ASTM D 1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.

M. ASTM D 1400 - Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base.

N. ASTM D 1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.

O. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

P. ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

Q. ASTM D 2248 - Standard Practice for Detergent Resistance of Organic Finishes.

R. ASTM D 2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

S. ASTM D 3359 - Standard Test Methods for Measuring Adhesion by Tape Test.

T. ASTM D 3363 - Standard Test Method for Film Hardness by Pencil Test.

U. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.

V. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

W. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).

X. CDA A4050 - Copper in Architecture - Handbook current edition.

Y. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements, for submittal procedures.

B. Contractor shall have all submittals in to the Consultant prior to the preconstruction meeting.

C. Contractor shall provide Owner with one hard copy and one electronic copy of manufacturer's

D. Material Safety Data Sheets (MSDS) for all material prior to bringing on site.

E. Contractor shall submit to the Consultant for approval, one electronic copy of all materials used on project, identified by building to be used on, manufacturer's name, size, thickness, type or grade. List shall be submitted on Contractor's letterhead stationary.

F. If requested, Contractor shall submit actual samples of prefinished material showing the exact colors and texture(s) available for color selection.

G. Contractor shall submit for approval one electronic copy of shop drawings showing any proposed detail changes.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Contractor to counter flash with metal all vertical surfaces flashed with roofing.

C. Where metal is hooked to a continuous cleat, crimp metal to cleat full length.

D. Utilize good weather to utmost. Plan and schedule all work to occur during least threatening weather. Contractor to have standing arrangement with all subcontractors, all parties agreeing to proceed as arranged, but also agreeing to adjust to sudden changes of weather.

E. Work, once begun, will leave building subject to leakage and therefore must be considered in state of emergency when weather threatens. Existing building shall be protected by Contractor from water entering through any roof or parapet area under repair for life of the project.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sheet Metal Flashing and Trim Manufacturers:

1. Shop Fabricated metal flashings, other than the engineered perimeter edge metal specified in Section 07 71 00 Roof Specialties - Pre Manufactured Warranted Edge Metal.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SHEET MATERIALS

A. Stainless Steel: ASTM A167 AISI 302/304
   1. No 2D finish, temperas required for forming and performance; 0.018” thick (28 gage), except as otherwise indicated.

B. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); .040" thick Aluminum, shop pre-coated with Kynar 500 coating.
   1. Kynar 500 Shop-applied, coil coating system, 70% Kynar 500® FSF® resin-based, fluoropolymer coating system, on aluminum.
   2. Color: As selected by Designer/Owner from manufacturer's standard colors.

C. Concealed Cleats
   1. Aluminum: ASTM B 209 (ASTM B 209M); 0.050 inch thick; mill-finish.

D. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gage, (0.0156 inch) (0.40 mm) thick; smooth No. 4 - Brushed finish, fabricated for counterflashing wind clips only.

2.03 ACCESSORIES

A. Fasteners: Stainless steel, with soft neoprene washers.

B. Concrete Masonry Fasteners:
   1. Galvanized Deformed Shank, zinc expansion with stainless steel pin or screw type fastener requiring a predrilled hole. Nylon expansion fasteners and fasteners not requiring a predrilled hole are not allowed. Head to be countersunk or rounded. Fastener to provide a minimum of 250 lbs. per foot pullout resistance in any direction.

C. Sealant:
   1. 1. One part gun grade polyurethane base elastomeric joint sealant conforming to all applicable requirements of Federal Specification TT-S-00230C, Type II, Class A.
   2.

D. Secondary Flashing (either/or option):
   1. Elastomeric sheet membrane, minimum 30 mils.
   2. TPO roofing membrane, 60-mils.

E. Concealed Screws:
   1. Cadmium plated pan head sheet metal screw.

F. Exposed Screws:
   1. Nonmetallic stainless steel sheet metal screw. When screw is specified to have a weather tight washer, washer shall have an integral stainless steel metal cap.

G. Nails:
   1. 11 or 12 gauge shank, minimum 3/8" head; nail composition similar to base metal being fastened.

H. Solder: ASTM B32; Sn50 (50/50) type.

2.04 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.

D. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.

E. Fabricate flashings to allow toe to extend 2 inches (50 mm) over top of masonry wall / nailer transition. Return and brake edges.

2.05 GUTTER AND DOWNSPOUT FABRICATION @ENGINE 20 & 24

A. Gutters: Match existing Rectangular profile.

B. Downspouts: match existing profile.

C. Accessories: Profiled to suit gutters and downspouts.
   1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
   2. Gutter Supports: Brackets.
   3. Downspout Supports: Brackets.

D. Downspout Boots: Steel.

E. Downspout Extenders: Same material and finish as downspouts.

F. Seal metal joints.

2.06 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers.

B. Primer: Zinc chromate type.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

E. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

3.03 INSTALLATION

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.

B. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

C. Seal metal joints watertight.

D. Solder stainless metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

E. Secure gutters and downspouts in place with concealed fasteners.

F. Slope gutters 1/4 inch per 10 feet (2.1 mm per m), minimum.

G. Connect downspouts to downspout boots, and grout connection watertight.

3.04 FIELD QUALITY CONTROL

A. Inspection will involve inspection of work during installation to ascertain compliance with specified requirements.

3.05 SCHEDULE

A. Through-Wall Flashing in Masonry: 302/304 .018 " Stainless

B. Gutters and Downspouts: replace in like kind, if required,

C. Coping, Cap, Parapet: .040" thick Aluminum, shop pre-coated with Kynar 500 coating.

D. Flashings Associated with Roofing Tiles, including Valley, Hip, Ridge, Eave, Gutter Edge, Gable Edge, Chimney:

E. Sheet Metal Roof Expansion Joint Covers, and Roof-to-Wall Joint Covers: 302/304 .018 " Stainless

F. Sill and ledge metal fabrications: 302/304 .018 " Stainless

G. Counter flashings at Roofing Terminations (over roofing base flashings): 302/304 .018 " Stainless

H. Counter flashings at Curb-Mounted Roof Items, including skylights and roof hatches: 302/304 .018 " Stainless

I. Roofing Penetration Flashings, for Pipes, Structural Steel, and Equipment Supports: 302/304 .018 " Stainless

J. Snow Guards:

END OF SECTION 07 6200

SECTION 07 7100
ROOF SPECIALTIES - PRE-MANUFACTURED WARRANTED EDGE METAL - ENGINE 4, 5 & 24

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section is included for the perimeter edge metal to be incorporated with the membrane manufacturer to accompany and compliment the installation with a special project warranty.

B. Manufactured roof specialties, including metal edge and fascia.

1.02 RELATED REQUIREMENTS

A. Section 07 5419 - Polyvinyl-Chloride Membrane Roofing

B. Section 07 6200 - Sheet Metal Flashing and Trim

C. Section 07 9200 - Joint Sealants

1.03 PREINSTALLATION MEETINGS

A. Convene preinstallation meeting 2 weeks before start of installation of fascia or copings.

B. Require attendance of parties directly affecting Work of this Section, including Contractor, Designer, installer and manufacturer’s representative.

C. Review the Following:
1. Materials.
2. Installation.
3. Adjusting.
4. Cleaning.
5. Protection.
6. Coordination with other Work.

1.04 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

C. NRCA ML104 - The NRCA Roofing and Waterproofing Manual Fifth Edition, with interim updates.

D. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

E. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems 2011.

1.05 SUBMITTALS

A. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

B. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.

C. Submit specific product FM Roof Nav number and print approval listing product FM rating.

D. Color Samples: Submit manufacturer’s color samples of kynar finished fascia or coping, or ring consisting of complete color chips representing manufacturer’s full range of available colors.

E. Samples: Submit two appropriately sized samples of coping and gravel stop.

F. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members and perimeter conditions requiring special attention.

G. Manufacturer’s Certification: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.

H. Special Project Warranty Documentation: Submit manufacturer's standard warranty. Minimum 20-year, 120 mph wind warranty on fascia or coping system, 30-year, kynar finish warranty minimum, 5 year workmanship warranty minimum on the manufactured fascia or coping systems specified.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Manufacturer regularly engaged in the manufacturing of fascia and coping systems of a similar type to that specified for a minimum of 10 years.

B. Fascia and Coping Testing Requirements: All manufactured fascia and copings must be FM tested and listed on Roof Nav for verification in accordance with FM4435.

C. Fascia and coping systems must be documented by an independent testing provider to meet or exceed minimum wind speed design in accordance with the latest version of ANSI SPRI ES-1 FM4435 in the version of International Building Code adopted by the Owner having jurisdiction.

D. Installer's Qualifications:
   1. Installer regularly engaged in installation of fascia and coping systems of similar type to that specified for a minimum of 5 years.
   2. Use persons trained for installation of fascia and coping systems following manufacturer's installation instructions.

E. Perform work in accordance with SMACNA (ASMM) details.

F. Maintain copies of Specifications, Plans and Manufacturers Installation manual on site at all times during the project installation.

1.07 DELIVERY STORAGE AND HANDLING

A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging.

B. Storage and Handling Requirements:
   1. Store and handle materials in accordance with manufacturer's instructions.
   2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
   3. Store materials in clean, dry area indoors.
   4. Do not store materials directly on floor or ground.
   5. Protect materials and finish during storage, handling and installation to prevent damage.

1.08 WARRANTY

A. Warranty Period, Product: 5-year workmanship warranty covering replacement or repair of products that are defective in material or workmanship.

B. Warranty Period, Finish: Limited 30-year warranty for prefinished coil-coated steel and aluminum coated, with Kynar 500 standard colors covering fade, chalk, and film integrity.

C. Warranty Period, Product: Limited 20-year, 120 mph wind warranty for properly installed fascia, perimeter edge metal and coping systems from straight line wind events.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Roof Edge Flashings:
   1. Manufacturer: Metal-Era, Inc., 1600 Airport Road, Waukesha, Wisconsin 53188. Phone 800-558-2162. Fax 800-373-9156. www.metalera.com http://www.metalera.com quotes@metalera.com mailto:quotes@metalera.com.
   2. Manufacturer: Johns Manville
   3. Manufacturer: Sika Sarnafil
   4. Approved shop fabricated Perimeter edge metal with ANSI / SPRI and Manufacturers Certifications for similar wind uplift and warranties as identified in Section 1.06 Quality Assurance. All Substitutions must be approved by Consultant prior to bid date.

2.02 MANUFACTURED FASCIA

A. Skirted PVC Coated Drip Edge: 2-piece fascia, skirted drip edge version with TPO or PVC factory attached.
   1. Provides watertight termination at leading edge of roofing material.
   2. Material: 24-gauge (0.65-mm) galvanized stainless steel with factory applied TPO or PVC finish to match manufacturer of roofing system, with factory applied 6” or 8”, 60 mil, PVC skirt, factory applied to match manufacturer of roofing system.

B. Fabrication
   1. Color: Match Roofing System
   2. Formed Lengths: 12’-0” (3.65 m).
   3. Slotted Fastening Holes: 12 inches (305 mm) on center.
   4. Prenotched Lap Joints: 3 inches (76 mm).

2.03 COMPONENTS

A. Roof Edge Flashings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
   1. Configuration: Fascia, cant and edge securement for roof membrane.
   2. Material: Formed aluminum sheet, 0.050 inch (1.3 mm) thick, minimum.
   3. Manufacturers:
      a. Approved Membrane Manufacturer's Metal Edge components to be included in the Special Project Warranty and roof membrane manufacturer's systems warranty.
      b. Metal-Era, Inc., 1600 Airport Road, Waukesha, Wisconsin 53188. Phone 800-558-2162. Fax 800-373-9156. www.metalera.com. quotes@metalera.com.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

A. Sealant for Joints in Linear Components: As recommended by component manufacturer.

B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

2.05 FINISHES

A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that deck, curbs, roof membrane, base flashing and other items affecting work of this Section are in place and positioned correctly.

B. Examine areas to receive edge metal or expansion joint cover.

C. Verify surfaces to support edge metal or expansion joint cover are clean, dry, straight, secure and of proper dimensions.

D. Notify Designer of conditions that would adversely affect installation.

E. Do not begin installation until unacceptable conditions are corrected.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions.

B. Remove protective vinyl film immediately before installation.

C. Install edge metal or expansion joint cover to provide watertight termination at leading edge of roofing material.

D. Install edge metal or expansion joint cover per manufacturer’s instructions to allow for thermal movement.

E. Seal joints within components when required by component manufacturer.

F. Anchor components securely.

G. Coordinate installation of components of this section with installation of roofing membrane and base flashings.

H. Coordinate installation of sealants with work of this section to ensure water tightness.

I. Coordinate installation of flashing flanges into reglets.

3.03 ADJUSTING

A. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Designer.

B. Remove and replace with new material, damaged components that cannot be successfully repaired, as determined by Designer.

3.04 CLEANING

A. Clean edge metal or expansion joint cover promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that could damage finish.

3.05 PROTECTION

A. Protect installed fascia or coping system to ensure that, except for normal weathering, counterflashing will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 07 7100

SECTION 07 7110
ROOF SPECIALTIES - PRE-MANUFACTURED GUTTER AND DOWNSPOUTS - ENGINE 4 & 5

ROOF SPECIALTIES - ENGINE 24

1.01 SECTION INCLUDES

A. This section is included for the perimeter edge metal to be incorporated with the membrane manufacturer to accompany and compliment the installation with a special project warranty.

B. Manufactured roof specialties, including gutters and downspouts.

1.02 RELATED REQUIREMENTS

A. Section 07 5419 - Polyvinyl-Chloride Membrane Roofing

B. Section 07 6200 - Sheet Metal Flashing and Trim

C. Section 07 9200 - Joint Sealants

1.03 PREINSTALLATION MEETINGS

A. Convene preinstallation meeting 2 weeks before start of installation of fascia or copings.

B. Require attendance of parties directly affecting Work of this Section, including Contractor, Designer, installer and manufacturer’s representative.

C. Review the Following:
   1. Materials.
   2. Installation.
   3. Adjusting.
   4. Cleaning.
   5. Protection.
   6. Coordination with other Work.

1.04 REFERENCE STANDARDS

A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems 2017.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

D. NRCA ML104 - The NRCA Roofing and Waterproofing Manual Fifth Edition, with interim updates.

E. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

F. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems 2011.

1.05 SUBMITTALS

A. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

B. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.

C. Submit specific product FM Roof Nav number and print approval listing product FM rating.

D. Color Samples: Submit manufacturer’s color samples of kynar finished fascia or coping, or ring consisting of complete color chips representing manufacturer’s full range of available colors.

E. Samples: Submit two appropriately sized samples of coping and gravel stop.

F. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members and perimeter conditions requiring special attention.

G. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

H. Special Project Warranty Documentation: Submit manufacturer's standard warranty. Minimum 20-year, 120 mph wind warranty on fascia or coping system, 30-year, kynar finish warranty minimum, 5 year workmanship warranty minimum on the manufactured fascia or coping systems specified.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Manufacturer regularly engaged in the manufacturing of fascia and coping systems of a similar type to that specified for a minimum of 10 years.

B. Fascia and Coping Testing Requirements: All manufactured fascia and copings must be FM tested and listed on Roof Nav for verification in accordance with FM4435.

C. Fascia and coping systems must be documented by an independent testing provider to meet or exceed minimum wind speed design in accordance with the latest version of ANSI SPRI ES-1 FM4435 in the version of International Building Code adopted by the Owner having jurisdiction.

D. Installer's Qualifications:
   1. Installer regularly engaged in installation of fascia and coping systems of similar type to that specified for a minimum of 5 years.
   2. Use persons trained for installation of fascia and coping systems following manufacturer's installation instructions.

E. Perform work in accordance with SMACNA (ASMM) details.

F. Maintain copies of Specifications, Plans and Manufacturers Installation manual on site at all times during the project installation.

1.07 DELIVERY STORAGE AND HANDLING

A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging.

B. Storage and Handling Requirements:
   1. Store and handle materials in accordance with manufacturer's instructions.
   2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
   3. Store materials in clean, dry area indoors.
   4. Do not store materials directly on floor or ground.
   5. Protect materials and finish during storage, handling and installation to prevent damage.

1.08 WARRANTY

A. Warranty Period, Product: 5-year workmanship warranty covering replacement or repair of products that are defective in material or workmanship.

B. Warranty Period, Finish: Limited 30-year warranty for prefinished coil-coated steel and aluminum coated, with Kynar 500 standard colors covering fade, chalk, and film integrity.

C. Warranty Period, Product: Limited 20-year, 120 mph wind warranty for properly installed fascia, perimeter edge metal and coping systems from straight line wind events.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Roof Edge Flashings:
   1. Manufacturer: Metal-Era, Inc., 1600 Airport Road, Waukesha, Wisconsin 53188. Phone 800-558-2162. Fax 800-373-9156. www.metalera.com http://www.metalera.com, quotes@metalera.com mail to:quotes@metalera.com.
   2. Manufacturer: Johns Manville
   3. Manufacturer: Sika Sarnafil

4. Approved shop fabricated Perimeter edge metal with ANSI / SPRI and Manufacturers Certifications for similar wind uplift and warranties as identified in Section 1.06 Quality Assurance. All Substitutions must be approved by Consultant prior to bid date.

2.02 COMPONENTS

A. Copings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
   1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
   2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3 to positive and negative design wind pressure as defined by applicable local building code.
   3. Wall Width: Verify in field.
   4. Outside Face Height: As indicated on drawings.
   5. Inside Face Height: As indicated on drawings.
   6. Material: Formed aluminum sheet, 0.050 inch (1.3 mm) thick, minimum.
   7. Finish: 70 percent Kynar.
   8. Color: As scheduled.
   9. Manufacturers:
      a. Metal-Era Inc: www.metalera.com/#sle.
      b. Approved Membrane Manufacturers Metal Edge components to be included in the systems warranty.
      c. P. Hickman Company; PermaSnap 2 Coping: www.wph.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

A. Sealant for Joints in Linear Components: As recommended by component manufacturer.

B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

2.04 FINISHES

A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that deck, curbs, roof membrane, base flashing and other items affecting work of this Section are in place and positioned correctly.

B. Examine areas to receive edge metal or expansion joint cover.

C. Verify surfaces to support edge metal or expansion joint cover are clean, dry, straight, secure and of proper dimensions.

D. Notify Designer of conditions that would adversely affect installation.

E. Do not begin installation until unacceptable conditions are corrected.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions.

B. Remove protective vinyl film immediately before installation.

C. Install edge metal or expansion joint cover to provide watertight termination at leading edge of roofing material.

D. Install edge metal or expansion joint cover per manufacturer’s instructions to allow for thermal movement.

E. Seal joints within components when required by component manufacturer.

F. Anchor components securely.

G. Coordinate installation of components of this section with installation of roofing membrane and base flashings.

H. Coordinate installation of sealants with work of this section to ensure water tightness.

I. Coordinate installation of flashing flanges into reglets.

3.03 ADJUSTING

A. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Designer.

B. Remove and replace with new material, damaged components that cannot be successfully repaired, as determined by Designer.

3.04 CLEANING

A. Clean edge metal or expansion joint cover promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that could damage finish.

3.05 PROTECTION

A. Protect installed fascia or coping system to ensure that, except for normal weathering, counterflashing will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 07 7110

SECTION 07 7210
ROOF SPECIALTIES - RAIL CURBS AND ROOF HATCH - ENGINE 4

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies requirements for the following Scope of Work:
   1. Provide roof accessory components as indicated on the Drawings.
   2. Provide new Roof Hatches.
   3. Provide new roof/rail curbs for large duct extensions above the finished roof in accordance with the specifications below.

1.02 SUBMITTALS

A. Product Data: For each type of roof accessory indicated.

B. Shop Drawings: Show fabrication and installation details for rail curb system and roof accessories.

C. Manufacturer Installation Instructions: For each product in Part 2.

1.03 QUALITY ASSURANCE

A. A. Comply with manufacturer's recommendations and requirements.

B. B. Verify locations, dimensions, and substrate conditions before installation.

PART 2 - PRODUCTS

2.01 DUCT AND CONDUIT SUPPORTS

A. Duct Support:
   1. Telescoping 12 gauge, stainless steel unistrut frame, 1-5/8-inch by 1-7/8-inch, with
   2. 18-inches by 18-inches, high-density polypropylene bases and stainless steel hardware.

B. Conduit Support:
   1. Stainless steel strut with high-density polypropylene base, 10-inches by 16-inches by 3-inches with stainless steel hardware, and stainless steel hardware, or as indicated on drawings.

2.02 ROOF CURBS

A. Roof/Rail Curbs: Provide metal roof curbs, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Fabricate with welded or sealed mechanical corner joints, with integral formed mounting flange at perimeter bottom. Coordinate dimensions with roof openings.
   1. Material: Stainless steel sheet, 0.018 inch thick.
   2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
   3. Factory installed wood nailers at tops of curbs.
   4. Factory insulation with 1-1/2-inch thick, glass-fiber board insulation.
   5. Curb height shall be determined by adding thickness of roof insulation and minimum base flashing height recommended by roofing membrane manufacturer, or support with wood block. Fabricate units to a minimum height of 12 inches above roof.

2.03 ROOF HATCHES

A. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated double-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing.
   1. Type and Size: Double-leaf lid, Field measure (1 on roof area 17 and 18).
   2. Curb and Lid Material: Aluminum sheet, 0.090 inch.
   3. Insulation: Cellulosic-fiber board.

4. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
5. Exterior Curb Liner: Manufacturer's standard metal liner of same material and finish as metal curb.
6. Fabricate units to minimum height of 12-inches above roof, unless otherwise indicated.
7. Hardware: Stainless-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.

2.04 SPLASH BLOCK

A. High-density concrete, natural color; 12-inches by 30-inches; to divert water in one direction.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General Scope of Work
   1. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction to ensure that combined elements are weatherproof and watertight.
   2. Install roof accessory items according to construction details in NRCA's "Roofing and Waterproofing Manual," unless otherwise indicated,
   3. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.
   4. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

B. Curb Installation
   1. Verify that structural bracing has been added where scheduled below roof deck.
   2. Set flange on deck and secure with specified fasteners, minimum 2 per side and maximum 8-inches on center.

C. Duct and Conduit Supports
   1. Place protection layer on completed roof membrane to extend beyond base minimum 3-inches in each direction.
      a. Set supports to provide stable base for ducts and conduits. Adjust as necessary. Accurately locate and align.
   2. Set duct supports at same locations as existing supports.
   3. Set pipe supports at 4-feet on center, maximum, unless otherwise indicated.
   4. Secure ducts and conduit to supports.

3.02 REINSTALLATION

A. Reinstall all MEP equipment disturbed or disconnected by work of this section. Extend and reconnect all electrical and mechanical connections associated with the required modifications, test and restore normal operation of equipment.

3.03 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION 07 7210

SECTION 07 9200
JOINT SEALANTS - ENGINE 4, 5, 8, 20 & 24

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section is included as a general guide for sealant repairs

B. Nonsag gunnable joint sealants.

C. Joint backings and accessories.

D. Owner-provided field quality control.

1.02 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

C. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2016.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.

E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2018.

F. ASTM C1311 - Standard Specification for Solvent Release Sealants 2014.

G. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints 2019 (Reapproved 2020).

1.03 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

1.04 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

E. Field Quality Control Plan:
   1. Visual inspection of entire length of sealant joints.

2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
    a. Test the entire length of every sealant joint.
    b. If any failures occur in the first 10 linear feet (3 linear m), continue testing at 12 inches (305 mm) intervals at no extra cost to Owner.
3. Field testing agency's qualifications.
4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.

F. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Continuous Method.
1. Repair failed portions of joints.

1.05 WARRANTY

A. Correct defective work within a two year period after Date of Substantial Completion.

B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
1. Tremco Global Sealants: www.tremcosealants.com.
2. Triangle Fastener Corporation, www.trianglefastener.com
3. Sika Corporation: www.usa-sika.com. Sikaflex PRO for control joints.
4. Sonalastic MP-1.
5. ChemLink M1.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
    a. Wall expansion and control joints.
    b. Joints between door, window, and other frames and adjacent construction.
    c. Joints between different exposed materials.
    d. Openings below ledge angles in masonry.
    e. Metal standing seam roof upgrades..
2. Do not seal the following types of joints.
    a. Intentional weepholes in masonry.
    b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
    c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
    d. Joints where installation of sealant is specified in another section.
    e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use nonsag, UV resistant polyurethane sealant, unless otherwise indicated.
1. Lap Joints in Sheet Metal Fabrications: one-part urethane.
2. Lap Joints between Manufactured Metal Panels: Silicone .

2.03 NONSAG JOINT SEALANTS

A. Sealant for Metal standing roof upgrades:

B. Type S - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Class 50, Uses NT, M, G, A and O; not expected to withstand continuous water immersion or traffic.
   1. Elongation: ASTM D412 - Plus and minus 500-650 percent, minimum.
   2. Tensile strength - ASTM D412 - 140 - 200 psi
   3. Tear Resistance - ASTM D624 - 30 - 35 Pil.
   4. Specific Gravity: 1.00 - 1.25.
   5. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
   6. Tear resistance - ASTM D 624 - 30 -35 Pil.
   7. Color: To be selected by Designer from manufacturer's standard range.
   8. Service Temperature Range: -40 to +400 degrees F (-40 to 204.4 degrees C).
   9. Manufacturers:
   10. Triangle Fasteners Corporation
      a. Substitutions: See Section 01 6000 - Product Requirements.
   11. Manufacturers:
      a. Sika Corporation; Sikaflex-1a: www.usa-sika.com/#sle.
      b. Sonalastic.
      c. ChemLink.

C. Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, nonsag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.

2.04 ACCESSORIES

A. Backer Rod as Required: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet (30 linear m), notify Designer immediately.

C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION 07 9200

SECTION 08 3100
ACCESS DOORS AND PANELS - ENGINE 5

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted access units.

1.02 RELATED REQUIREMENTS

A. Section 09 9200: [_____] Field Painting.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.

C. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications 2020a.

D. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

F. ASTM A513/A513M - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing 2020a.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.

I. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings 2018, with Editorial Revision.

J. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

K. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

L. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire 2019.

M. FM (AG) - FM Approval Guide current edition.

N. ITS (DIR) - Directory of Listed Products current edition.

O. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Project Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units with Return Air Grille: Basis of Design is MiFab Universal Access door.
   1. Location: As indicated on drawings.

2. Panel Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
3. Size: Contractor to field measure existing opening.
4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
6. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Designer of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to proceeding with this work.

B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION 08 3100

SECTION 09 9200
FIELD PAINTING - ENGINE 5 & 8

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

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

B. Mill-, factory- and shop-applied prime and finish coats: As specified with the product. This section is for miscellaneous field applied painting not specified in other sections.

C. Section 076200 Sheet Metal Flashing and Trim

1.02 SUMMARY:

A. This section specifies furnishing and applying paint at the site.
   1. As shown on Drawings.

B. Definitions:
   1. Paint: Includes primers, paints and enamels.

1.03 SUBMITTALS:

A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
   1. Samples:
      a. Three each of each color and texture, with identification of materials keyed to those specified and application methods.
      b. Samples of paint scheduled for application to smooth finishes applied to 12-inch square hardboard or metal panels.
      c. Samples of paint scheduled for application to concrete masonry units applied to 16-inch square by two-inch thick panel of concrete masonry units, including one tooled masonry joint. Subdivide panel to define prime or filler, intermediate and finish coats.

1.04 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:
   1. Comply with codes and regulations of the jurisdictional authorities.
   2. FS: TT-E-489, TT-E-490, TT-E-509, TT-F-336, TT-F-1098, TT-P-19, TT-P-29, TT-P-636, TT-P-641, TT-P-645, TT-P-650, TT-P-664, TT-P-1510, TT-P-001984, TT-S-71, TT-S-300, TT-V-86, TT-V-119.
   3. ASME: A13.1.
   4. ANSI: Z535.1.
   5. ASTM: A242, A588, B117, C476, C920.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver products to the jobsite in their original unopened containers clearly labeled with the manufacturer's name and brand designation, referenced specification number and type, as applicable.

B. Store products in an approved ventilated dry area, protect from contact with soil and from exposure to the elements. Always keep products dry. Do not allow paint to freeze.

C. Handle products in a manner that will prevent breakage of containers and damage to products.

1.06 JOB CONDITIONS:

A. Environmental Requirements:
   1. Do not apply paint to non-protected surfaces in wet weather or to surfaces on which ice, frost, water or dampness is visible.
   2. Do not apply exterior paint when the temperature is below 40F or expected to fall below this temperature. Do not apply interior paint when the temperature is lower than 60F or expected to fall below this temperature.

3. Avoid painting steel which is at a temperature which can cause blistering, porosity, or otherwise be detrimental to the life of the paint. When paint is applied in hot weather or thinned in cold weather ensure that the specified thickness of paint coating is obtained.
4. Do not apply paint in rain, wind, snow, fog or mist or when the steel surface temperature is below the dew point, resulting in condensation of moisture.

PART 2 - PRODUCTS

2.01 GENERAL:

A. To the maximum extent practicable, use the materials of one manufacturer throughout the project. No claims as to the suitability of a material specified, or of inability to produce first-class work with these materials, will be considered unless such claims are made in writing and submitted with the Contractor's Bid Proposal.

B. Provide a primer suitable for each substrate type and which is manufactured or recommended by the paint manufacturer as part of a complete painting system.

C. Previously Primed Surfaces:
1. If surfaces have been primed off-site at the mill, factory or shop, omit specified primer, but only if the off-site primer is acceptable to the paint system manufacturer for best performance of the specified paint system.
2. For touch-up of off-site primer, use primer of the same composition as the mill, factory or shop primer.

D. VOC Requirements: Provide products in compliance with local volatile organic compound regulations. If the listed product of a manufacturer does not comply, provide an accepted equivalent product which does comply.

E. Colors:
1. Prior to beginning work, the Contractor will be furnished sample color chips and a Color and Material Schedule for surfaces to be painted.
2. Final approval of colors will be made by the Owner on samples applied on the job.

F. Listed materials are a guide to quality intended. Substitute materials and paint systems acceptable to the Designer, as an equal or of superior quality for each intended use, may be used in the work at no additional cost to the Owner.

G. Accessory Materials:
1. General: Provide miscellaneous materials and accessories, whether listed or not, as necessary to complete the work in an approved manner.
2. Caulk: Single-component, chemically curing, synthetic rubber, non-sag, ASTM C920, Type S, NS, Class 25.
3. Thinner: As recommended by the paint manufacturer.

2.02 EXTERIOR PAINTING SYSTEMS:

A. Exterior Paint Schedule: Provide the paint systems scheduled below for the various substrates, as indicated. Provide a complete paint system by one manufacturer for each substrate. Unless otherwise indicated, provide the following:
1. Ferrous metal: Silicone-alkyd, semi-gloss.

B. Ferrous Metal - Alkyd, semi-gloss: Two coats over primer (primer is not required on shop-primed items):
1. Primer: Quick-drying, rust-inhibiting primer for priming ferrous metal under alkyd enamel (FS TT-P-664):
   a. Con-Lux: Ferrox Primer, 25 Red.
   b. Devoe: 41820 Bar-Ox Alkyd Shop/Field Primer.
   c. Moore: Ironclad Retardo Rust-Inhibitive Paint #163.
   d. S-W: Kem Kromik Metal Primer B50N2/B50W1.
2. Undercoat: Weather-resistant, air-drying, semi-gloss alkyd enamel for use on the exterior over prime-coated ferrous metal (FS TT-E-489, Class A):

a. Con-Lux: Enamelite Semi-Luster Series
b. Devoe: 70XX Mirrolac Interior/Exterior Alkyd Enamel.
c. Moore: Impervo Enamel #133.
d. S-W: Industrial Enamel, B-54Z Series.

3. Finish Coat: Weather-resistant, air-drying, semi-gloss alkyd enamel for use on the exterior over under-coated ferrous metal (FS TT-E-489, Class A):
   a. Con-Lux: Enamelite Semi-Luster Series.
   b. Devoe: 70XX Mirrolac Interior/Exterior Alkyd Enamel.
   c. Moore: Impervo Enamel #133.
   d. S-W: Industrial Enamel, B-54Z Series.

PART 3 - EXECUTION

3.01 PREPARATORY WORK:

A. Inspect surfaces for their suitability to receive a finish. In the event that imperfections due to materials or workmanship appear on surfaces, make the appropriate corrections at no additional cost to the Owner. Correct damage to painted or decorated finishes due to carelessness or negligence of other trades.

B. Clean surfaces to be painted as necessary to remove dust and dirt. Sand as necessary to properly prepare surfaces to receive paint or varnish.

C. Wash metal surfaces with benzine or mineral spirits to remove dirt, oil or grease before applying paint. Where rust or scale is present, wire brush or sandpaper clean before painting.

D. Coordinate the work of this section with the work of other trades.

3.02 APPLICATION:

A. Apply paint by spray in accordance with the manufacturer's directions to achieve required dry film thickness (DFT). Where specifically approved by the Designer, use rollers or brushes as best suited for material being applied. For covers on rollers use carpet with velvet back and high-pile sheep's wool or use short-hair covers, as best suited for material and texture specified. Except where otherwise noted, apply paint to a minimum dry-film thickness (DFT) of five mils, excluding filler coats, using no less than the number of coats specified in Part 2 – Products.

B. Apply material evenly and smoothly without runs, sags or other defects with edges of paint adjoining other materials or color sharp and clean, without overlapping.

C. Do not paint and finish while surfaces are damp. Allow sufficient time between coats, in accordance with manufacturer's directions to produce an evenly smooth finish.

D. Do not apply final coats until after other trades, whose operations would be detrimental to finish painting, have finished their work in the areas to be painted and the areas have been approved for painting.

3.03 PROTECTION:

A. Dispose of soiled cleaning rags and waste at the close of each day's work or store such soiled rags and waste in metal containers with tight-fitting covers. Provide buckets of sand during painting operations for use in the event of fire. Post NO SMOKING signs as necessary and as directed.

B. Protect the work of other trades against damage or injury by use of suitable covering during the progress of the painting and finishing work. Repair damage to the satisfaction of the Designer.

3.04 CLEANING:

A. Upon completion of work, remove staging, scaffolding and containers from the site. Remove paint spots, oil or stains from glass, floors and other surfaces not to be painted, and leave job clean and acceptable to the Designer.

END OF SECTION 09 9200

SECTION 22 0010
ROOF DRAIN AND STORM WATER PIPING - ENGINE 8, 20, 24

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

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

B. Section 07 6000 – Sheet Metal Flashings.

1.02 SUMMARY

A. This section includes products and installation procedures for the replacement or addition of roof drain assemblies and related plumbing components.

B. All new installations are to include plumbing pipe through the first elbow to a horizontal line.

C. This section also addresses plumbing vent extensions in conjunction with the new roofing system.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. A74-98 - Standard Specification for Cast Iron Soil Pipe and Fittings.
   2. C564-97 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
   3. D2564-02 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
   4. D2665-02a - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

B. Cast Iron Soil Pipe Institute (CISPI): 301-90 Hubless Cast Iron Soil and Fittings.

C. Factory Mutual (FM): FM 1680-89 – Coupling Used in Hubless Cast Iron Systems for Drains, Waste and Vent Systems.

D. National Fire Protection Association (NFPA).

E. National Association of Plumbing-Heating-Cooling Contractors (PHCC): National Standard Plumbing Code (1996).

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Jay R. Smith Manufacturing Company, Montgomery, AL.

B. Tyler Pipe/Wade Division, Tyler, TX.

C. Zurn Industries, Inc., Erie, PA.

2.02 PRODUCTS

A. Cast-iron roof drain, no-hub style outlet, size to match existing, minimum four (4) inches:
   1. Model 1010 (by Smith).
   2. Series 3000 Roof Drain (by Tyler).
   3. Model Z-100 (by Zurn).
   4. Roof drain assembly options:
      a. Cast-iron gravel stop/clamping ring.
      b. Cast-iron or cast-aluminum strainer (not plastic).
      c. Cast-iron extension ring (where required to raise clamping ring height above deck).
   5. Approved equal.

B. Drainage piping:
   1. Shall be PVC pipe conforming to ASTM D2665; use Schedule 40 pipe in heated spaces, Schedule 80 pipe in unheated spaces.
   2. Shall match drain outlet diameter, minimum four (4) inches.

3. Fittings shall conform to ASTM D2665:
    a. Solvent Welded Socket Type: Use solvent cement, ASTM D2564.
    b. Threaded Type: Molded threads only. Use tape or lubricant specifically intended for use with PVC plastic pipe.
4. Connection to cast-iron piping, where applicable, shall meet the requirements and criteria for pressure, leak, deflection and shear tests as outlined in Factory Mutual No. 1680 for Class 1 couplings.
    a. Stainless steel, clamp-type coupling of elastomeric sealing sleeve, ASTM C564 and a Series 300 stainless steel shield and clamp assembly. Sealing sleeve with center-stop to prevent contact between pipes/fittings being joined shall be marked ASTM C564.
5. Shall be cast-iron pipe conforming to ASTM A74, CISPI-301, Service Class; use Schedule 40 pipe in heated spaces, Schedule 80 pipe in unheated spaces.
    a. Shall match drain outlet diameter, minimum four (4) inches.
    b. Shall be bell and spigot, modified hub, or plain end (no-hub) as required by selected jointing method.
6. Joints: Provide any one of the following types to suit pipe furnished:
    a. Double seal, compression-type molded neoprene gasket. Gaskets shall suit class of pipe being jointed.
    b. Mechanical: Shall meet the requirements and criteria for pressure, leak, deflection and shear tests as outlined in Factory Mutual No. 1680 for Class 1 couplings.
        1) Stainless steel, clamp-type coupling of elastomeric sealing sleeve, ASTM C564 and a Series 300 stainless steel shield and clamp assembly. Sealing sleeve with center-stop to prevent contact between pipes/fittings being joined shall be marked ASTM C564.
        2) Cast-iron coupling with neoprene gasket and stainless steel bolts and nuts.

C. Piping accessories:
1. Provide piping expansion joints, hangers, anchors, etc. necessary for proper installation of drainage piping system.
2. Pipe insulation: Shall be one (1) inch thick, sized to fit piping; provide mitered sections of same material, with jointing tape to cover fittings and drain bowl.
    a. Preformed Fiberglas #25 ASJ (by Owens-Corning Corporation, Toledo, OH).
    b. Approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General requirements:
1. A Plumbing Contractor that is licensed in the state where the project is located shall perform all Work of this section.
2. Comply with the PHCC National Standard Plumbing Code.
3. Pipe shall be round and straight. Cutting shall be done with proper tools. Cast-iron pipe shall be reamed to full size after cutting.
4. All pipe runs shall be laid out to avoid interference with other work.
5. Piping four (4) inches or larger in diameter shall be installed with minimum 1/8 inch per foot slope-to-drain.

B. Existing drain head replacement:
1. Disconnect and remove the existing roof drain head. If the existing roof drain was set into a recessed sump pan, remove the sump pan.
2. Install new cast-iron roof drain assembly and set height of new drain bowl using either of the following options:
    a. Shim bowl to the proper height, relative to the roof deck surface, to match the new insulation thickness.

b. Install bowl at deck surface in a steel receiver plate; install a cast-iron extension ring to attain clamping point at new insulation thickness.

3. Secure the drain bowl to the deck with under-deck clamping ring.
4. Connect the drain bowl to the existing drainage piping on the building interior.
5. Insulate the drainage piping from the drain bowl to the vertical drop.

C. Final adjustments:

1. After installation of new roof membrane, install the lead flashing and cast-iron clamping ring and tighten clamping bolts. Re-tighten after membrane has “acclimated” for thirty (30) days.
2. All drains, whether new or existing, shall be provided with an undamaged, cast-iron or cast-aluminum strainer. Install strainer and secure in place.
3. Paint drain assemblies and plumbing stack flashings with aluminum paint.

END OF SECTION 22 0010

SECTION 23 0510
MECHANICAL AND ELECTRICAL GENERAL REQUIREMENTS - ENGINE 8, 20, 24

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

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

B. Section 07 6000 – Sheet Metal Flashings.

1.02 SUMMARY

A. This Section specifies requirements for the following Scope of Work:
   1. All roof curbs must meet the manufacturers' minimum height requirements above the finished roof system surface to accommodate the new membrane flashing and terminations for the special project warrantable application.
   2. Mechanical disconnection, extension, shortening, and/or reconnection shall be performed in accordance with the current District of Columbia adopted International Building Code, Mechanical.
   3. Electrical disconnection, extension, shortening, and/or reconnection shall be performed in accordance with the current District of Columbia adopted International Building Code, Electrical.
   4. Plumbing work shall be performed in accordance with the current District of Columbia adopted International Building Code, Plumbing.
   5. Details, not shown or specified but necessary for proper modification, installation and operation shall be included within the work as though specified herein.
   6. It is the Contractor's responsibility to identify the means and methods of the required modifications and alterations that will be needed to achieve the approved flashing height for the special project roof warranty.

1.03 SUBMITTALS

A. Shop Drawings: Provide detailed Drawings including plans, elevations and connections of equipment.
   1. Include seals and signatures of Registered Professional in the District of Columbia.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. Mechanical, electrical, and associated work shall be performed by a District of Columbia licensed tradesman and shall comply with the applicable code requirements.

B. Wherever possible match the existing mechanical and electrical components; replace in kind when made necessary by roofing operations.

C. Lengthening and installation of additional connections for ducts, conduits, control wiring, condensate pipes and similar mechanical and electrical work made necessary by roof replacement work shall be identified and incorporated into the project scope of work prior to the bid and performed by the successful Contractor.

D. Handle, store, and protect equipment and materials to prevent damage before and durin g installation.

E. This work will most likely be required during off hours as it will require MEP disconnects that may impact the interior conditioned space.

F. New RTU conduit and gas lines that are in the field of the roof will be required to receive new piping supports.

3.02 AIR CONDITIONING RTU REMOVAL AND REINSTALLATION

A. Coordinate unit disconnection with building occupants. In no case shall an individual unit be out of service for more than 1 calendar day, unless previously approved by Owner.

B. Disconnect, extend, raise, or otherwise modify existing ductwork and mechanical / electrical conduit as required to restore operation to the unit.

C. Provide temporary cooling, or heating of interior spaces if disconnection exceeds 2 hours.

END OF SECTION 23 0510