CONSTRUCTION DOCUMENTS

ROOF REPLACEMENT SPECIFICATIONS

LAKEVIEW MIDDLE SCHOOL

3801 OLD BUNCOMBE RD,
GREENVILLE, SC 29617

PREPARED FOR:

GREENVILLE COUNTY SCHOOLS

301 EAST CAMPERDOWN WAY,
GREENVILLE, SC 29601

BY

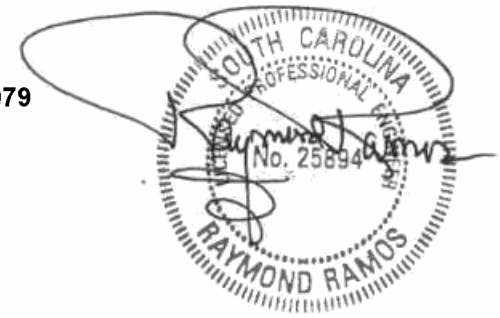
RAYMOND
SINCE 1992
Raymond Engineering - Georgia, Inc.

Raymond Project No.: GSP1010.079
February 21st, 2024

Shea Ogilvie, QAO

Dylan Johnson, RRO, RRC

Raymond Ramos, RRC, PE



SECTION 00 01 02
PROJECT DIRECTORY

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END OF SECTION

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Drawings

DIVISION 01

GENERAL REQUIREMENTS

SECTION 01 11 00
SUMMARY OF WORK

PART 1 – GENERAL

1.1 Work Covered by Contract Documents

1.1.1 Work under this Contract consists of furnishing all labor, materials, and equipment necessary to perform the quality remedial roof replacement at Lakeview Middle School, 3801 Old Buncombe Rd, Greenville, SC 29617, as shown on Drawing Nos. G-001 through S-102. The work will include, but is not necessarily limited to, the following:

1.1.1.1 Prior to the start of work, Contractor shall inspect the underside of the roof deck at all roof areas. Contractor shall provide a written report to Designer and Owner documenting presence of spray-applied-fire-resistant-materials and existing damage to the fire-resistant-materials.

1.1.1.2 At all Roof Areas remove and properly dispose the existing aggregate, cant strips, base flashings, and associated insulation down to the existing metal or concrete deck.

1.1.1.3 At all Roof Areas, remove and properly dispose the existing metal flashings, including lead flashings, expansion joint covers, coping, and counter flashings.

1.1.1.4 At all Roof Areas, remove and properly dispose of existing scupper liners, conductor heads, and downspouts.

1.1.1.5 At all Roof Areas, remove existing drain bowl assemblies and the first 10-feet of drain leaders and discard.

1.1.1.6 At all Roof Areas, remove and properly dispose of existing pipe flashings and pitch pans.

1.1.1.7 At all Roof Areas, remove and properly dispose of abandoned penetrations in the deck as marked on drawings or on the roof. Close associated openings in the deck as specified.

1.1.1.8 At all Roof Areas, raise existing curbs to a minimum finished flashing height of 8-inches above the new roof surface.

1.1.1.9 At all Roof Areas, extend soil vent pipes to a minimum finished flashing height of 8-inches above the new roof surface.

1.1.1.10 At all Roof Areas, remove and replace any deteriorated wood blocking, as specified. Refer to Unit Price No. 1.

1.1.1.11 At all Roof Areas, furnish and install new wood blocking at roof eaves and rake edges to match the level of the new roof.

1.1.1.12 At Roof Areas A1, A2, A3, A4, A5, A6, A7, A8, A9 and A10 furnish and install a new 60-mil adhered TPO or PVC roof system, adhered coverboard, one layer of adhered 1/8-inch-per-foot tapered isocyanurate insulation, one layer of fully adhered isocyanurate insulation and one layer of mechanically fastened isocyanurate insulation (Min R-20), as specified.

i) Provide manufacturer’s 20-year No Dollar Limit Warranty.

b) **(Additive Alternate No. (1)** Furnish and install a new 80-mil adhered TPO or PVC roof system in lieu of the 60-mil membrane in all Roof Areas.

i) Provide manufacturer's 30-year No Dollar Limit Warranty

1.1.1.13 At Roof Areas B1, B2 and B3 furnish and install a new 60-mil adhered TPO or PVC roof system, adhered coverboard, one layer of adhered isocyanurate insulation, and one layer of mechanically fastened isocyanurate insulation (Min R-20), as specified.

i) Provide manufacturer's 20-year No Dollar Limit Warranty.

b) **(Additive Alternate No. (1)** Furnish and install a new 80-mil adhered TPO or PVC roof system in lieu of the 60-mil membrane in all Roof Areas.

i) Provide manufacturer's 30-year No Dollar Limit Warranty

1.1.1.14 At Roof Areas C1 and C2, furnish and install a new 60-mil adhered TPO or PVC roof system, adhered coverboard, one layer of adhered 1/8-inch-per-foot tapered isocyanurate insulation, and two layers of fully adhered isocyanurate insulation. (Min R-20), as specified.

i) Provide manufacturer's 20-year No Dollar Limit Warranty.

b) **(Additive Alternate No. (1)** Furnish and install a new 80-mil adhered TPO or PVC roof system in lieu of the 60-mil membrane in all Roof Areas.

i) Provide manufacturer's 30-year No Dollar Limit Warranty

1.1.1.15 At all Roof Areas, furnish and install separator board and new 60-mil TPO or PVC membrane base flashings and membrane expansion joints, as necessary and as specified.

1.1.1.16 At all Roof Areas, furnish and install new metal flashings, including, coping, gravel stops, and counterflashing as specified.

1.1.1.17 At Roof Areas A7, A8, B1, B2 and B3 furnish and install new scupper liners, conductor heads, and downspouts as specified.

1.1.1.18 At Roof Areas A1, A2, A3, A4, A5, A6, A9, A10, C1 and C2 furnish and install new drain assemblies and associated leaders at existing locations as specified.

1.1.1.19 At Roof Areas A1, A3, and A4 furnish and install new primary drains and associated drain leaders in locations shown on the drawings.

1.1.1.20 At Roof Area A8 and B3, furnish and install new overflow scuppers at locations shown on the drawings.

1.1.1.21 At all roof areas, enlarge the existing overflow scuppers to match the adjacent primary scupper size.

1.1.1.22 Furnish and install new splash blocks at all downspouts that empty onto the roof surface or onto the ground as specified.

1.1.1.23 Raise, scrape, prime, and paint gas lines. Furnish and install new non-penetrating premanufactured supports as specified.

1.1.1.24 Remove all PVC condensation lines and replace with new copper condensation lines as specified. Existing copper condensation lines shall remain.

1.1.1.25 Scrape, prime, and paint ladders. Secure any loose ladder fasteners.

1.1.1.26 Furnish and install miscellaneous items as required to ensure a watertight roofing system.

1.1.1.27 Furnish and install any miscellaneous items, as specified herein.

1.2 Description of the Existing Roof System

1.2.1 Information in this Section is provided only to establish a general description and the Contractor is responsible for visiting the site to satisfy themselves to the existing conditions, size of Roof Areas, etc. before submitting their Bid.

1.2.2 The roof assemblies are composed of the following:

1.2.2.1 Roof Area A1, A2, A3, A4, A5 & A6

a) The roof surfacing is aggregate adhered by asphalt.

b) The roofing is approximately 1/4-inch-thick asphalt impregnated felts.

c) The coverboard is 3/4-inch-thick mineral perlite.

d) The roof insulation is 1-1/2-inch-thick isocyanurate insulation.

e) The roof deck is a flat metal deck.

1.2.2.2 Roof Area A7

a) The roof surfacing is aggregate adhered by asphalt.

b) The roofing is approximately 1/2-inch-thick asphalt impregnate felts.

c) The coverboard is one layer of 1/2-inch-thick mineral perlite.

d) The tapered insulation is varying thickness isocyanurate.

i) Roof is approximately 10”-thick at the cored location.

e) The deck is a flat metal deck.

1.2.2.3 Roof Area A8

a) The roof surfacing is aggregate adhered by asphalt.

b) The roofing is approximately 1/2-inch-thick asphalt impregnate felts.

c) The coverboard is one layer of 3/4-inch-thick mineral perlite.

d) The tapered insulation is varying thickness isocyanurate.

i) Roof is approximately 6-inch-thick at the cored location.

e) The deck is a flat metal deck.

1.2.2.4 Roof Area A9

a) The roof surfacing is aggregate adhered by asphalt.

b) The roofing is approximately 1/2-inch-thick asphalt impregnated felts.

c) The coverboard is 1-inch-thick mineral perlite.

d) The roof insulation is 2-inch-thick isocyanurate insulation.

e) The roof deck is a flat metal deck.

1.2.2.5 Roof Areas A10

a) The roof surfacing is aggregate adhered by asphalt.

b) The roofing is approximately 1/2-inch-thick asphalt impregnated felts.

c) The cover board is one layer of 1/2-inch-thick mineral perlite.

d) The tapered insulation is varying thickness.

e) The roof insulation is a layer of 1-inch-thick and a second layer of 2-inch thick isocyanurate insulation.

i) Roof is approximately 7-inch-thick at the cored location.

f) The roof deck is a flat metal deck.

1.2.2.6 Roof Areas B1 and B2

a) The roof surfacing is aggregate adhered by asphalt.

b) The roofing is approximately 1/2-inch-thick asphalt impregnated felts.

c) The cover board is one layer of 1/2-inch-thick mineral perlite.

d) The roof insulation is 3-inch-thick isocyanurate insulation.

e) The roof deck is a structurally sloped metal deck.

1.2.2.7 Roof Area B3

a) The roof surfacing is aggregate adhered by asphalt.

b) The roofing is approximately 1/2 -inch-thick asphalt impregnated felts.

c) The cover board is one layer of 1/2-inch-thick mineral perlite.

d) The roof insulation is 3-inch-thick isocyanurate insulation.

e) The roof deck is a sloped metal deck, the roof ridge is structurally flat metal deck.

1.2.2.8 Roof Areas C1 and C2

a) The roof surfacing is aggregate adhered by asphalt.

b) The roofing is approximately 1/2-inch-thick asphalt impregnated felts.

c) The cover board is one layer of 3/4-inch-thick mineral perlite.

d) The roof insulation is 1-1/2-inch-thick isocyanurate insulation.

e) The base sheet is asphalt ply.

f) The roof deck is a flat concrete deck.

1.2.3 The approximate size of each area is as follows:

1.2.3.1	Roof Area A1	8,397	square feet
1.2.3.2	Roof Area A2	8,863	square feet
1.2.3.3	Roof Area A3	8,283	square feet
1.2.3.4	Roof Area A4	21,155	square feet
1.2.3.5	Roof Area A5	106	square feet
1.2.3.6	Roof Area A6	105	square feet
1.2.3.7	Roof Area A7	2,236	square feet
1.2.3.8	Roof Area A8	311	square feet
1.2.3.9	Roof Area A9	17	square feet
1.2.3.10	Roof Area A10	516	square feet
1.2.3.11	Roof Area B1	1,727	square feet
1.2.3.12	Roof Area B2	1,301	square feet
1.2.3.13	Roof Area B3	15,919	square feet
1.2.3.14	Roof Area C1	977	square feet
1.2.3.15	Roof Area C2	944	square feet
	Total:	**70,857**	**square feet**

1.2.4 An asbestos analysis detected no asbestos-containing materials in the roofing at Lakeview Middle School. See attached report.

PART 2 – PRODUCTS: Not used.

PART 3 – EXECUTION: Not used.

END OF SECTION

EMSL Analytical, Inc.

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EMSL Order:	072401122
Customer ID:	RENE99
Customer PO:	
Project ID:	

Attention:	INC. AIR ALLERGEN AND MOLD TEST Air Allergen & Mold Testing 1543 Lilburn Stone Mountain Rd Suite 200 Stone Mountain, GA 30087	**Phone:**	(770) 938-4861
		Fax:	(770) 270-0853
		Received Date:	02/05/2024 9:25 AM
		Analysis Date:	02/06/2024
		Collected Date:	
Project:	42597		

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
1-Layer 1 *072401122-0001*	Roof 1 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
1-Layer 2 *072401122-0001A*	Roof 1 Field	Black Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
1-Layer 3 *072401122-0001B*	Roof 1 Field	Black Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
1-Layer 4 *072401122-0001C*	Roof 1 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
2-Layer 1 *072401122-0002*	Roof 1 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
2-Layer 2 *072401122-0002A*	Roof 1 Flashing	Black Non-Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
2-Layer 3 *072401122-0002B*	Roof 1 Flashing	Black Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
3-Layer 1 *072401122-0003*	Roof 2 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3-Layer 2 *072401122-0003A*	Roof 2 Field	Black Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
3-Layer 3 *072401122-0003B*	Roof 2 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
4-Layer 1 *072401122-0004*	Roof 2 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
4-Layer 2 *072401122-0004A*	Roof 2 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
4-Layer 3 *072401122-0004B*	Roof 2 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
5-Layer 1 *072401122-0005*	Roof 3 Walkway Pad	Black Fibrous Homogeneous	5% Synthetic	95% Non-fibrous (Other)	None Detected
5-Layer 2 *072401122-0005A*	Roof 3 Walkway Pad	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
6-Layer 1 *072401122-0006*	Roof 3 Flashing	Black Fibrous Homogeneous	5% Glass	95% Non-fibrous (Other)	None Detected

Initial report from: 02/06/2024 12:13:29

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			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
6-Layer 2 *072401122-0006A*	Roof 3 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
7-Layer 1 *072401122-0007*	Roof 3 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
7-Layer 2 *072401122-0007A*	Roof 3 Field	Black Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
7-Layer 3 *072401122-0007B*	Roof 3 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
8-Layer 1 *072401122-0008*	Roof 5 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
8-Layer 2 *072401122-0008A*	Roof 5 Flashing	Black Fibrous Homogeneous	5% Glass	95% Non-fibrous (Other)	None Detected
9-Layer 1 *072401122-0009*	Roof 5 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
9-Layer 2 *072401122-0009A*	Roof 5 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
9-Layer 3 *072401122-0009B*	Roof 5 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
9-Layer 4 *072401122-0009C*	Roof 5 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
10-Layer 1 *072401122-0010*	Roof 6 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
10-Layer 2 *072401122-0010A*	Roof 6 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
10-Layer 3 *072401122-0010B*	Roof 6 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
10-Layer 4 *072401122-0010C*	Roof 6 Field	Yellow Fibrous Homogeneous	80% Glass	20% Non-fibrous (Other)	None Detected
11-Layer 1 *072401122-0011*	Roof 6 Flashing	Black Non-Fibrous Homogeneous	5% Synthetic	95% Non-fibrous (Other)	None Detected
11-Layer 2 *072401122-0011A*	Roof 6 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
12-Layer 1 *072401122-0012*	Roof 6 Walkway Pad	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
12-Layer 2 *072401122-0012A*	Roof 6 Walkway Pad	Black Non-Fibrous Homogeneous	10% Synthetic	90% Non-fibrous (Other)	None Detected
13-Layer 1 *072401122-0013*	Roof 7 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected

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Customer ID: RENE99
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Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
13-Layer 2 *072401122-0013A*	Roof 7 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
13-Layer 3 *072401122-0013B*	Roof 7 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
14-Layer 1 *072401122-0014*	Roof 7 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
14-Layer 2 *072401122-0014A*	Roof 7 Flashing	Black Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
14-Layer 3 *072401122-0014B*	Roof 7 Flashing	Black Fibrous Homogeneous	5% Glass	95% Non-fibrous (Other)	None Detected
15-Layer 1 *072401122-0015*	Roof 8 Flashing	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
15-Layer 2 *072401122-0015A*	Roof 8 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
16-Layer 1 *072401122-0016*	Roof 8 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
16-Layer 2 *072401122-0016A*	Roof 8 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
16-Layer 3 *072401122-0016B*	Roof 8 Field	Black Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
16-Layer 4 *072401122-0016C*	Roof 8 Field	Gray Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
17-Layer 1 *072401122-0017*	Roof 9 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
17-Layer 2 *072401122-0017A*	Roof 9 Field	Black Non-Fibrous Homogeneous	3% Cellulose 7% Glass	90% Non-fibrous (Other)	None Detected
17-Layer 3 *072401122-0017B*	Roof 9 Field	Gray Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
18-Layer 1 *072401122-0018*	Roof 9 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
18-Layer 2 *072401122-0018A*	Roof 9 Flashing	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
18-Layer 3 *072401122-0018B*	Roof 9 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
19-Layer 1 *072401122-0019*	Roof 10 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
19-Layer 2 *072401122-0019A*	Roof 10 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

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			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
19-Layer 3 *072401122-0019B*	Roof 10 Flashing	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
20-Layer 1 *072401122-0020*	Roof 10 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
20-Layer 2 *072401122-0020A*	Roof 10 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
20-Layer 3 *072401122-0020B*	Roof 10 Field	Black Non-Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
20-Layer 4 *072401122-0020C*	Roof 10 Field	Gray Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
21-Layer 1 *072401122-0021*	Roof 11 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
21-Layer 2 *072401122-0021A*	Roof 11 Field	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
21-Layer 3 *072401122-0021B*	Roof 11 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
22-Layer 1 *072401122-0022*	Roof 12 Field	Black Fibrous Homogeneous	15% Glass	85% Non-fibrous (Other)	None Detected
22-Layer 2 *072401122-0022A*	Roof 12 Field	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
23-Layer 1 *072401122-0023*	Roof 13 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
23-Layer 2 *072401122-0023A*	Roof 13 Field	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
24-Layer 1 *072401122-0024*	Roof 13 Flashing	Black Non-Fibrous Homogeneous	5% Synthetic	95% Non-fibrous (Other)	None Detected
24-Layer 2 *072401122-0024A*	Roof 13 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
25-Layer 1 *072401122-0025*	Roof 14 Flashing	Black Non-Fibrous Homogeneous	5% Synthetic	95% Non-fibrous (Other)	None Detected
25-Layer 2 *072401122-0025A*	Roof 14 Flashing	Black Fibrous Homogeneous	60% Glass	40% Non-fibrous (Other)	None Detected
25-Layer 3 *072401122-0025B*	Roof 14 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
26-Layer 1 *072401122-0026*	Roof 14 Field	Black Non-Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
26-Layer 2 *072401122-0026A*	Roof 14 Field	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected

Initial report from: 02/06/2024 12:13:29

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			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
26-Layer 3 *072401122-0026B*	Roof 14 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
27-Layer 1 *072401122-0027*	Roof 15 Field	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
27-Layer 2 *072401122-0027A*	Roof 15 Field	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
27-Layer 3 *072401122-0027B*	Roof 15 Field	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28-Layer 1 *072401122-0028*	Roof 15 Flashing	Black Non-Fibrous Homogeneous	5% Synthetic	95% Non-fibrous (Other)	None Detected
28-Layer 2 *072401122-0028A*	Roof 15 Flashing	Black Fibrous Homogeneous	60% Glass	40% Non-fibrous (Other)	None Detected
29-Layer 1 *072401122-0029*	Roof 16 Field	Black Non-Fibrous Homogeneous	5% Synthetic	95% Non-fibrous (Other)	None Detected
29-Layer 2 *072401122-0029A*	Roof 16 Field	Black Fibrous Homogeneous	60% Glass	40% Non-fibrous (Other)	None Detected
30-Layer 1 *072401122-0030*	Roof 16 Flashing	Black Non-Fibrous Homogeneous	5% Synthetic	95% Non-fibrous (Other)	None Detected
30-Layer 2 *072401122-0030A*	Roof 16 Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
30-Layer 3 *072401122-0030B*	Roof 16 Flashing	Black Fibrous Homogeneous	60% Glass	40% Non-fibrous (Other)	None Detected

Analyst(s)
Anthony Sanaie (59)
Violedah Richardson (25)

Violedah Melissa Richardson
Violedah Richardson, Laboratory Manager
or Other Approved Signatory

Initial report from: 02/06/2024 12:13:29

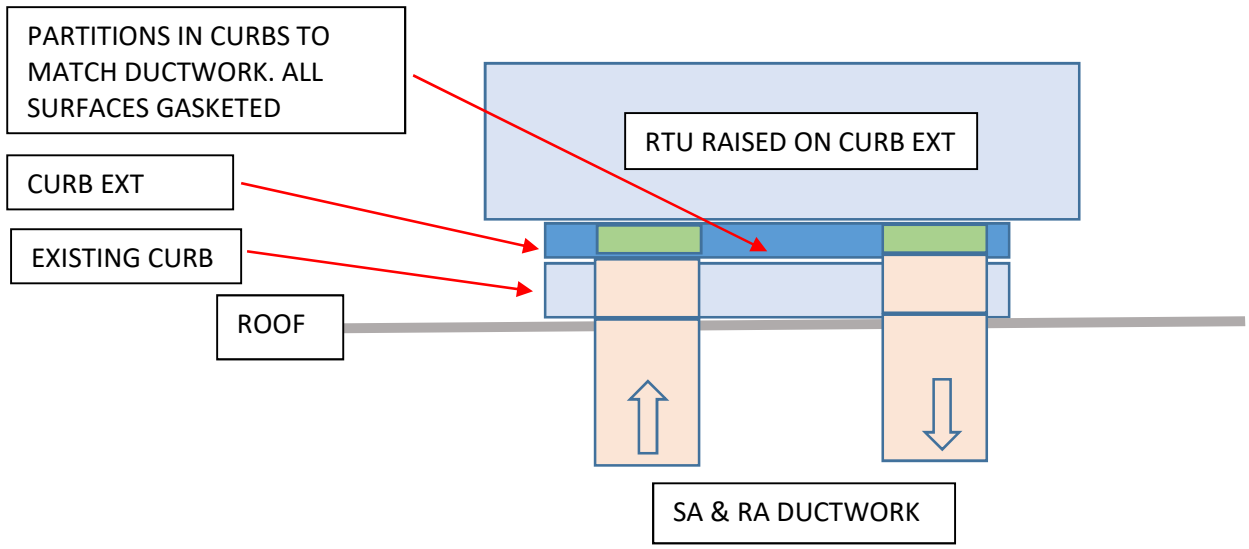
MECHANICAL (HVAC) CONSIDERATIONS FOR RE-ROOF PROJECT 3/16/20 Rev 1

General Requirements

1. Mechanical work includes any modifications to rooftop equipment during a re-roof project. Included are Packaged RTU's, Air Handlers, Fans, Condenser Units, Dust and Fume Collectors, piping, wiring, ductwork, curbs, stands, mounting rails, roof and/or wall brackets. This includes equipment raising (curb extensions) relocations, re-positioning, refrigerant piping, CHW & HHW piping, condensate piping, natural gas piping, electrical disconnects, convenience outlets, rooftop lighting, and HVAC controls.
2. All work shall be in accordance with recognized State and Federal Codes and Standards AND GCSD Design Standards.
3. Specific details for each condition shall be developed and submitted for review by GCSD prior to execution. Allow 7 business days for review.
4. ALL Work shall be performed by a Lic. Mech Contractor approved by GCSD. Attached is a list of GCSD IDC Mechanical Contractors as of March 2020. Likewise, Electrical Work shall be performed by Lic. Electrical Contractor.
5. **ALL Mechanical/Electrical Work shall carry a 24 month 'bumper-bumper' parts and labor warranty**.

Curb Mounted Units

1. Raising and/or repositioning curb mounted units usually involves a curb extension, adapter, or new curb. This work usually breaks the unit duct connections. Ductwork is normally fastened to the existing curb and mates to the RTU via a gravity gasket connection. Roofer along with selected Mech Contr shall thoroughly inspect existing conditions and provide specific details for matching new work to old work. This work shall include as-built inspections for ductwork leaks (both outside and inside the building) and any remedial repair or warranty work to correct leaks. Worst case scenario is re-lifting and re-gasket of curb/curb extension. Typical schematic pasted below.



IDC – PACKAGED EQUIPMENT CONTRACTOR SERVICES

BID 116-28-4-20

McCarter Mechanical Inc.
685 John Dodd Rd,
Spartanburg, SC 29303
Scott McCarter
(864) 599-7883

Gregory Electric Company, Inc.
P.O. BOX 170519
SPARTANBURG, SOUTH CAROLINA 29301
Tom Cook
864-283-2785

Jennings-Dill Inc
33 Grand Ave
Greenville, SC 29607
(864) 434-0618
Andy Lockliar

W B Guimarin & Co Inc
1327 Miller Rd # B,
Greenville, SC 29607
Chris Bigalke
864.675-1000

Cullum Services
121 Webb Street
Simpsonville, SC 29681
Esteban Uzarraga
843.747-2900

RUTHERFORD HEATING & AIR
737 E. MAIN ST.
SPINDALE, NC 28160
Alan Murray
828-287-2240

Service Mechanical, Inc.
1851 Suber Mill Road
Greer, SC 29650
Brent Smith
864.608-2151

Johnson Controls
430 J Roper Mountain Road,
Greenville, SC 29615
Wayne Vafiadis
864.423-9155

Trane Carolinas
Ingersoll Rand
288 Fairforest Way
Greenville, SC 29607
Jim Cree
864.672-6000

MCG Mechanical
2000 Pearman Dairy Road
Anderson, SC 29625
David Cox
864.231-9157

SECTION 01 14 00
WORK RESTRICTIONS

PART 1 – GENERAL

1. Related Documents

1.1. Drawings and general provisions of the contract, including General Conditions, Supplementary Conditions and other Division 01 specification sections, apply to this section.

1.2. Use of Premises

1.2.1. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the work in indicated. Contractor shall weekly update the designer and owner of planned upcoming future work activities and Phasing Work Plans and notify Owner/Designer of any required or desired deviations as soon as these are identified.

1.2.1.1. Limits: Confine construction operations to the area inside the construction limits, as indicated on the site Plans.

1.2.1.2. Owner occupancy: The owner will occupy the site during construction, until and after substantial completion.

1.2.1.3. Installation of construction materials which are not noisy are not restricted and may be performed at any time.

1.2.1.4. All efforts shall be made to minimize disruption in the functioning of Lakeview Middle School. This includes minimizing noise and water intrusion affected by construction.

1.2.1.5. For any operation or activity that will disrupt, impact, or inconvenience Lakeview Middle School, a written notification shall be submitted to the owner at least 7 days prior to the required start of that operation or activity.

1.2.1.6. The contractor shall at all times protect the interior portions of the facility from damage due to weather, water intrusion or construction debris. Interior portions shall be watertight and secure at all times.

1.2.1.7. Facility is responsible for performing sensitive environmental tests which shall not be interrupted due to construction.

1.2.1.8. The contractor shall coordinate, with the Owner, the location of membrane installation prior to membrane installation. Contractor will receive confirmation from the Owner. Contractor shall provide to the Owner an installation plan drawing showing locations of roofing and dates/schedule on which installation is proposed to take place.

1.2.2. Owner occupancy: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before substantial completion, provided such occupancy does not interfere with completion of work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total work and will be coordinated with the Contractor.

1.2.2.1. Designer will prepare a certificate of substantial completion for each specific portion of the work completed and to be occupied before owner occupancy.

1.2.2.2. Obtain a certificate of occupancy from authorities having jurisdiction before owner occupancy.

1.2.2.3. Before partial owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, owner will provide, operate, and maintain mechanical and electrical systems serving occupied portions of building.

1.2.2.4. On occupancy, owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.2.3. School hours: During school operation hours the contractor shall not perform work without prior approval from the Owner. Standard school hours begin in August and are listed as follows:

1.2.3.1. High School: (8:30am – 4:30pm)

1.2.3.2. Middle School: (8:00am – 4:00pm)

1.2.3.3. Elementary School: (7:30am – 3:00pm)

PART 2 – PRODUCTS: Not Used.

PART 3 – EXECUTION: Not Used.

END OF SECTION

SECTION 01 22 13
UNIT PRICES AND ALLOWANCES

PART 1 - GENERAL

1.1 Work Included: All unit prices and allowances as listed in 02 41 13 Selective Demolition and Preparations.

1.2 Procedures:

1.2.1 **Owners Contingency**:

1.2.1.1 The contractor shall include in the base bid an Owner's Contingency in the amount of **Fifty Thousand Dollars ($50,000)**. (Unit Price No. 9)

1.2.1.2 Owner's contingency shall be for the Owner's exclusive use and shall be under the complete control of and authority of the owner's designated representative.

i Approval of the use of the Owner's Contingency may be provided through Change Order.

1.2.1.3 The Contractor shall be required to assist the Owner in keeping and maintaining a log of all contingency allocations for the duration of the project.

1.2.1.4 At project close out, credit unused amount remaining in the Owner's contingency and allowance to owner by Change Order.

1.2.2 Unit prices will be exercised at the option of the Owner.

1.2.3 Modify and coordinate related activities as required to complete the work if, and when, acceptance is designated by the Owner in the standard form of agreement.

1.2.4 In the event unit prices are exercised, applicable sections of this Specification shall govern. Other sections may be modified as required to address the unit price.

1.2.5 Cost associated with any anomalies identified on plans, on the roof, and/or in the Specification shall be included in the Base Bid.

1.2.6 Cost associated with any necessary removals at roof drains to install new roof drains and/or drain sumps shall be included in the Base Bid.

1.2.7 Cost associated with the repair of decking at removed abandoned penetrations identified on plans and/or marked on the roof shall be included in the Base Bid.

1.2.8 Bidders shall provide a unit price for the items listed on the Bid Form. Bidder shall include a cash allowance in the Base Bid for each unit price in the quantity list below and on the bid form. Payment will be made for unit price work in excess of the cash allowance, which includes all overhead and profit. In the event it is necessary to replace fewer than quantity associated with the cash allowance, the Owner will take a credit at the unit price rate. The Designer shall be responsible for verifying the actual quantity and extent of the unit price work.

1.2.9 In the event that Unit Price work exceeds listed Allowances by a quantity of 20%, Unit Price values shall be renegotiated and equitably adjusted.

PART 2 - PRODUCTS

2.1 See applicable specification sections.

PART 3 - EXECUTION

3.1 Refer to Section 02 41 13 Selective Demolition and Preparations of the Specification for unit prices.

3.2 Refer to Section 00 41 00 Bid Form for a list of allowances.

END OF SECTION

"EXHIBIT A"

UNIT PRICE SCHEDULE							
NO.	ITEM	UNIT	UNIT PRICE		ALLOWANCE		INCLUDED IN BASE BID
1	Wood Blocking Replacement	BF	$_____	x	5,000 BF	=	$_____
2	Deck priming	SF	$_____	x	4,000 SF	=	$_____
3	Deck Priming & Plate Installation	SF	$_____	x	4,000 SF	=	$_____
4	Steel Deck Replacement	SF	$_____	x	2,000 SF	=	$_____
5	Installation of Side Lap Screws	EA	$ _____	x	2,000 EA	=	$_____
6	Installation of Deck-to-Joist Screws	EA	$_____	x	2,000 EA	=	$_____
7	Concrete Repair Mortar	SQ	$_____	x	100 SQ	=	$_____
8	Sheet Metal-Over-Concrete Repair	SQ	$_____	x	100 SQ	=	$_____
9	Owners Contingency	N/A	$50,000	x	1	=	$_____

END OF "EXHIBIT A"

SECTION 01 23 00
ALTERNATES

PART 1 - GENERAL

1.1 Work Included: All alternates as listed in Bid Form

1.2 Procedures:

1.2.1 Alternates will be exercised at the option of the Owner.

1.2.2 Modify and coordinate related activities as required to complete the work if, and when, acceptance is designated by the Owner in AIA Document A101.

1.2.3 In the event alternates are exercised, applicable sections of this Specification shall govern. Other sections may be modified as required to address the alternate.

1.2.4 The Owner reserves the right to accept any alternate and to accept any combination of alternates.

PART 2 – PRODUCTS: See applicable specification sections.

PART 3 - EXECUTION

3.1 **Additive Alternate No. (1)**: Furnish and install a new 80-mil adhered TPO or PVC roof system in lieu of the 60-mil membrane in all Roof Areas. Provide manufacturer's 30-year No Dollar Limit Warranty and 72-mph wind rider.

END OF SECTION

SECTION 01 26 00
MODIFICATION PROCEDURES

PART 1 - PROCEDURES

1.1 Unit Price Work:

1.1.1 Changes to the contract price due to work accomplished based upon unit prices will be initiated by the Contractor. The Designer will complete AIA Document G701 in three copies and submit to the Contractor and Owner for signatures.

1.1.2 The Contractor is to immediately notify Designer of any work to be accomplished based upon unit prices and describe the scope of unit price work to be done prior to proceeding.

1.1.3 In submitting AIA Document G701, Contractor is to fully describe the amount accomplished and the total change to the Contract as a result of this Change Order. Shop drawings and/or roof plans to assist in describing the work scope shall be attached.

1.2 Changes In Scope Of Work:

1.2.1 Changes to the Contract Price due to work accomplished due to a change in scope of work will be initiated by the Contractor. The contractor-provided information will be used by the Designer in the development of AIA Document G70l. The Designer shall prepare the Change Order in three copies, and shall submit to the Contractor and Owner for signatures.

1.2.2 The Contractor must notify the Designer of any work that is not part of the Contract, but must be accomplished in order to continue with the project.

1.2.3 Prior to proceeding with such work, the Contractor is to provide the Owner with a description of the work being accomplished and a total cost for such work. Shop drawings and/or roof plans shall be attached, as required.

1.2.4 The Contractor is not authorized to proceed with such work until approved by the Owner. Notification to proceed may be verbal or in writing. If verbal, AIA Document G701 is to be submitted at the earliest opportunity.

PART 2 – PRODUCTS: Not used.

PART 3 – EXECUTION: Not used.

END OF SECTION

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 Summary - Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

1.1.2 Related work:

1.1.1.1 Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.1.1.2 Preparation and submittal of a schedule of values in required by the General Conditions.

1.1.1.3 Schedule of values is required to be compatible with the "continuation sheet" accompanying applications for payment, as described in Section 01 29 76. Contractor shall use the current AIA Form G703.

1.2 Submittals:

1.2.1 Prior to the first application for payment, submit a proposed schedule of values to the Designer.

1.2.2 Meet with the Designer, if necessary, and determine additional data required to be submitted.

1.2.3 Secure the Designer's approval of the schedule of values prior to submitting first application for payment.

1.3 Quality Assurance:

1.3.1 Use required means to assure arithmetical accuracy of the sums described.

1.3.2 When so required by the Designer, provide copies of the subcontracts or other data acceptable to the Designer substantiating the sums described.

PART 2 – PRODUCTS: Not Used.

PART 3 - EXECUTION

3.1 The following schedule of values shall be shown on AIA Form G703, unless otherwise specified or directed:

3.1.1 General and Supplementary Conditions

3.1.2 Payment and Performance Bonds

3.1.3 Division 01 -

3.1.4 Division 02 - Labor and Materials

3.1.5 Division 06 - Labor and Materials

3.1.6 Division 07 - Labor and Materials

3.1.6.1 Section 07 22 16 – Roof Board Insulation

3.1.6.2 Section 07 54 19 – Polyvinyl Chloride (PVC) Roofing

3.1.6.3 Section 07 54 23 – Thermoplastic Polyolefin (TPO) Roofing

3.1.6.4 Section 07 60 00 – Flashing and Sheet Metal

3.1.7 Division 22 – Labor and Materials

3.1.7.1 Section 22 05 59 – Hangers and Supports for Plumbing Piping and Equipment

3.1.7.2 Section 22 14 00 – Roof Drains

END OF SECTION

SECTION 01 29 76
APPLICATION FOR PAYMENT

PART 1 - GENERAL

1.1 Procedures:

1.1.1 Monthly pay estimates shall be submitted to Designer in quadruplicate on the current AIA Form G702. Form shall include the contract's Schedule of Values form, which shall be completed using AIA Form G703 unless otherwise specified.

1.1.2 Ninety percent (90%) of the value of materials stored at the site and ninety percent of work accomplished, less previous payments, shall be paid by Owner to Contractor in monthly installments upon Designer's certification. Final payment shall be made 30 days after Designer has certified completion to the Owner.

1.1.3 A payment or payments made to the Contractor for work performed shall not constitute acceptance or approval of the work and shall in no way relieve Contractor from the requirements of the Contract.

1.1.4 All sums received by the Contractor for any part or parts of the work furnished or performed by a Subcontractor or material supplier shall be paid promptly to the latter by Contractor and while in the hands of the Contractor shall constitute trust funds held for the use and benefit of Owner. Contractor shall submit with payment requests lien releases from subcontractors and material suppliers which state that subcontractors and suppliers have been paid for services and materials supplied to the project. All dates on the lien releases provided with payment applications from the Contractor shall be common. Payment requests may be delayed if not received in a timely manner.

1.1.5 At final payment, the Contractor shall submit a final conditional release of liens contingent upon the receipt of the remainder of the contract amount, including any approved change order, unit price work, and retainage. At final payment, the Contractor shall submit a zero-dollar final release of liens from all subcontractors and materials suppliers through the date of material completion.

1.1.6 If payments are to be made on account of materials or equipment not incorporated in the work, but delivered and suitably stored at the Site, or at such other location agreed upon in writing, such payments shall be conditioned upon submission by Contractor of bills of sale or other documents satisfactory to the Owner establishing Owner's title to such materials or equipment or otherwise protecting Owner's interest therein, including the prepayment of applicable insurance and transportation to the Site.

1.1.7 The Contractor shall submit with each application for payment a calendar showing workdays and weather days for the monthly application for payment. Weather days shall be considered days that work cannot be performed due to inclement weather, as reported by the National Weather Service, or approved equal.

1.2 Quality Assurance:

1.2.1 Prior to start of construction, secure the Designer's approval of the schedule of values required to be submitted in accordance with the General Conditions, and further described in Section 01 29 73 of these Specifications.

1.2.2 During progress of the Work, modify the schedule of values as approved by the Designer to reflect changes in the Contract Sum due to Change Orders or other modifications of the Contract. Base requests for payment on the approved schedule of values.

PART 2 – PRODUCTS: Not Used.

PART 3 – EXECUTION: Not Used.

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.1 Description: To provide for an orderly review during progress of the work and to provide for the systematic discussion of problems that may arise throughout the construction period.

1.2 Presentation: Each Contractor and major Subcontractor shall be represented at every meeting by a representative member of his organization. The Owner and/or his authorized representative shall also attend.

1.3 Submittals:

1.3.1 The proceedings of these meetings shall be recorded by the Designer, if required. One copy of the proceedings shall be furnished to Owner and each representative.

1.3.2 Conducting the meeting, recording and distributing meeting minutes shall not be construed that the Designer is scheduling or coordinating Contractor's work.

1.4 Decision Interpretations: All decisions and interpretations given by the Designer at project meetings shall be made on behalf of the Owner and shall be conclusive on each contractor affected.

PART 2 – PRODUCTS: Not Used.

PART 3 – EXECUTION

3.1 Pre-Bid Meeting: shall be held with Owner, Owner's Representative and Bidders at the Project Site at the time and date stated in the advertisement.

3.2 Pre-Construction Conference: shall be scheduled with the Owner and/or his representative, Contractor’s project manager/superintendent, Contractor's project foreman, and manufacturer's representative prior to start of work.

3.3 Agenda:

3.3.1 Contract Documents

3.3.2 Communication channels and procedures

3.3.3 Field change orders and decisions

3.3.4 Project meeting schedules

3.3.5 Construction schedule

3.3.6 Rules and regulations affecting the work

3.3.7 Safety requirements

3.3.8 Organization of Contractor, Subcontractors, and Suppliers

3.3.9 Shop drawings and submittals

3.3.10 Project record documents

3.4 Progress Meetings:

3.4.1 The Designer will schedule project meetings at his discretion, based upon the progress and quality of the work performed by the Contractor.

3.4.2 Agenda for progress meetings will include, but is not limited to:

3.4.2.1 Construction schedule

3.4.2.2 Change orders

3.4.2.3 Quality Control

3.4.2.4 Problems encountered, and actions taken

3.5 Location: Meetings shall be held at the job site to the maximum extent possible.

END OF SECTION

SECTION 01 32 13
CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 Summary:

1.1.1 To ensure adequate planning and execution of the work so as to complete the project within the time period allowed in the Contract and to assist the Designer in evaluating work progress.

1.1.2 "Day" used throughout the Contract shall mean "Consecutive Calendar Days" unless otherwise stated.

1.2 Schedule Adherence

1.2.1 Liquidated Damages: The Contractor represents and agrees that he has taken into account in his bid the requirements of the bid documents, the location, the time allowed for the work, local conditions, availability of materials, equipment, and labor, and any other factors which may affect performance of the work. The contractor agrees and warrants that he will achieve completion of the work no later than the specified time. If the Contractor fails to complete the work in the specified time, the Contractor shall pay the Owner the sum of one thousand dollars ($1,000.00) per day for each calendar day beyond the contract time as Liquidated Damages until the work has reached substantial completion.

1.2.2 Should any activity not be completed within 7 days after the scheduled completion date, Owner shall have the right to order the Contractor to expedite completion of work by whatever means the Owner deems appropriate and necessary without additional expense.

1.2.3 Should any activity be 15 or more days behind schedule, the Owner shall have the right to complete the activity or to have the activity completed by whatever means the Owner deems appropriate and necessary.

1.2.4 Any costs incurred by the Owner in connection with expedition of the construction activity under this article shall be reimbursed to the Owner by the Contractor. This may take the form of deductions from payments due Contractor.

1.2.5 Failure by the Owner to exercise the option to either order the Contractor to expedite any activity or to expedite an activity by other means shall not be considered precedent setting for any other activity.

1.2.6 Inclement Weather

1.2.6.1 Where the contract includes schedule requirements including, but not limited to, available working hours, available working days, construction durations, substantial completion date(s), and/or final completion date(s), these requirements shall be graphically shown in the construction schedule. The schedule shall be based on assuming normal inclement weather for each calendar month, and no contract time extensions shall be considered until the calendar month has experienced inclement weather beyond this normal consideration. Furthermore, the Contractor bears the burden of proof to show inclement weather beyond normal considerations, which shall include documentation from the National Weather Service (NWS), or approved equal prior to bid, that the reported inclement weather was outside of the specified parameters to perform the work of this specification. All inclement weather documentation shall be submitted in writing within the payment period for each occurrence.

1.2.6.2 Normal Inclement Weather for each calendar month shall be considered:

	Month	Days
(a)	January	6
(b)		

(c)	February	5
(d)	March	6
(e)	April	5
(f)	May	5
(g)	June	6
(h)	July	6
(i)	August	6
(j)	September	4
(k)	October	3
(l)	November	3
(m)	December	6

1.2.6.3 No consideration or extension shall be allowed for inclement weather days that fall outside any working restrictions.

1.2.6.4 Work under this specification shall be adequately staffed to complete the work of this specification given the specified work restrictions with considerations for normal inclement weather.

1.2.6.5 No financial compensation shall be made due to inclement weather, and any changes to the contract shall be no-dollar time extensions.

1.2.6.6 The contractor is expected to maintain construction in accordance with the approved schedule less any approved inclement weather days outside of normal considerations. Should the contractor fall behind schedule less any approved inclement weather days outside normal consideration, this shall be considered non-compliance with the contract and the Designer may act in accordance with the Contract Documents.

1.3 Schedule: Within 7 days after receipt of notice to proceed, the Contractor shall submit one reproducible and two prints of the construction schedule to the Designer.

1.4 Diagrams:

1.4.1 Graphically show the sequence and interdependence of all activities necessary to complete the work and the order in which such activities are to be accomplished as planned by the Contractor and his project field supervisor in coordination with all subcontractors whose work is shown on the diagram. Activities shown on the diagram shall include, but are not limited to:

1.4.1.1 Submittals and approvals of shop drawings and samples.

1.4.1.2 Project mobilization

1.4.1.3 Demolition/Roof preparation

1.4.1.4 Construction

1.4.1.5 Sheet Metal

1.4.1.6 Miscellaneous work

1.4.1.7 Final Cleanup

1.4.1.8 Final Inspection

1.4.1.9 All activities by the Designer which affects progress, required completion dates, or both, for all and each part of the Work.

1.4.2 The detail of information shall be such that duration times of activities shall normally range from 1 to 30

days. The selection and number of activities shall be subject to approval by the Designer.

PART 2 - PRODUCTS: Not Used.

PART 3 - EXECUTION

3.1 Construction Schedule

3.1.1 Within 10 days after the effective date of Agreement, the Contractor shall complete the analysis described in Article 1.4 of this Section in preliminary form. Meet with the Designer to review the contents of the proposed schedule and make all revisions agreed upon. Submit in accordance with Paragraph 1.4.1 of this section.

3.1.2 Revisions

3.1.2.1 Contractor shall make only those revisions to the construction schedule as are approved in advance by Designer.

END OF SECTION

SECTION 01 32 26
PROGRESS REPORTS

PART 1 - GENERAL

1.1 Summary: Contractor shall keep a daily progress report to provide a continuous record of the progress of this Work. The format of the report shall be as directed by the Designer.

1.2 Quality Assurance:

1.2.1 Reports shall be filled out daily by the Contractor's job site representative who shall be in a supervisory capacity.

1.2.2 Reports shall be completed by the same individual throughout the duration of the Project wherever possible.

PART 2 – PRODUCTS: Not Used.

PART 3 - EXECUTION

3.1 Report: Contractor shall complete one form for each workday.

3.1.1 Forms shall be completed for workdays shortened or cancelled due to weather, material shortages, labor conditions or holidays.

3.1.2 Forms shall be legible with all pertinent items.

3.1.3 Submit copies to the Designer upon request.

3.2 Information Required In The Contractor’s Daily Report Shall Include The Following:

3.2.1 Date

3.2.2 Company Name

3.2.3 Name of Superintendent/Foreman

3.2.4 Number of Workers

3.2.5 Weather Conditions

3.2.6 Location of Work Performed

3.2.7 Materials Installed

3.2.8 Description of Work Performed

3.2.9 Photographs of Unit Price Work (minimum of 4): Contractor required to maintain a functioning digital camera with a minimum resolution of 12 megapixels. Photographs taken on cell phones shall not be allowed.

3.2.10 Photographs of the day’s sequence of work (minimum of 8): Contractor required to maintain a functioning digital camera with a minimum resolution of 12 megapixels. Photographs taken on cell phones shall not be allowed.

3.2.11 Project Issues/Request for Information

3.2.12 Name of Visitors

END OF SECTION

SECTION 01 33 00
SUBMITTALS

PART 1 - GENERAL

1.1 Procedures:

1.1.1 Submit certain items with Bid and within 7 calendar days after receipt of signed Contract. The successful Contractor shall submit the required information to the Designer in 3 copies or in digital format as allowed by the Owner.

1.1.2 Each transmitted document shall identify the project name and Contractor. Material submittals shall also identify the type and trade name of materials, material manufacturer, intended use and specification number. The successful bidder shall request an electronic copy of the attached "Submittal Checklist" to complete and include with the submittals.

1.1.3 Submittals shall bear the Contractor's stamp and indicate approval and date.

1.1.4 After Designer's review of materials, revise and resubmit, as required, identifying changes made since previous submittal.

1.1.5 Upon approval by Designer, submittals will be forwarded to the Owner for review and approval.

1.2 Bid Submittals:

1.2.1 Proposed scope of work.

1.2.2 Unit Price Schedule – Section 01 22 13, Unit Prices and Allowances, Exhibit A

1.2.3 Safety Plan (Generic)

1.3 Site Specific Safety Plan – Refer to Section 01 66 00.

1.4 Construction Schedules: Refer to Section 01 32 13 of this Specification.

1.5 Shop Drawings, Samples and Product Data: Refer to Section 01 33 23 of this Specification.

1.6 Foreman's Statement: Submit on or before pre-construction conference.

1.7 Emergency phone number of principals, superintendent, foreman, project manager: Submit to Owner and Designer at Pre-Construction Conference.

1.8 Pre-Construction Submittals:

1.8.1 Prior to the start of the project, the following items need to be submitted within 7 calendar days after the receipt of signed Contract. The contractor shall fill out the attached Submittal checklist form, ensuring that all items listed in this section, referenced for submittal in the specification, and/or items to be used on this project are properly submitted. Items submitted must conform to the standards and expectations of that material, detail, and/or procedure expressed in this specification. If not, that item may be rejected for use by the Designer.

1.8.2 The following literature shall be submitted.

1.8.2.1 Contractor's Letter of Good Standing with Manufacturer.

1.8.2.2 Manufacturer’s Sample 20-year NDL warranty

1.8.2.3 Contractor’s 5-year warranty

1.8.2.4 Manufacturer’s Application Instructions

1.8.2.5 Contractor’s Foreman’s Statement

1.8.2.6 Contractor’s Construction Schedule

1.8.2.7 Contractor’s Schedule of Values

1.8.2.8 Manufacturer's Certificates

(a) Submit separate letters from the membrane manufacturer and the insulation manufacturer stating he has examined the plans, specifications and details for this project and approves the use of his products and systems on this project.

(b) Submit a letter from the membrane manufacturer acknowledging the brand name and type of insulation proposed for use and his approval of the use of this insulation with his products.

(c) Submit a letter from the insulation manufacturer acknowledging the brand name and type of roof membrane being proposed and his approval of the use of the roof membrane and system with his product.

(d) Submit a copy of the licensed membrane applicator agreement.

(e) If any membrane components are not packaged by the membrane manufacturer, submit a letter from the membrane manufacturer clearly identifying the component and acknowledging approval to use this component on this project.

1.8.3 Submit all materials as outlined in Part 2 of the Specification sections. Group and label material submittals by Specification Section.

1.8.4 Submit metal flashing color charts.

1.8.5 Submit shop drawings in accordance to Section 01 33 23.

1.9 Close-Out Submittals:

1.9.1 At the end of the project and prior to final payment, the following documents shall be submitted to the Designer:

1.9.1.1 Copies of all punch lists prepared by the Designer and documentation of completion.

1.9.1.2 Contractor's Warranty to Owner.

1.9.1.3 Manufacturer’s Guarantee

1.9.1.4 Contractor’s Final Payment Application

1.9.1.5 Consent of Surety for Final Payment

1.9.1.6 Final Lien Waiver

1.9.1.7 Contractor’s Affidavit of Payment of Debts and Claims

1.9.1.8 Contractor’s Affidavit of Release of Liens

1.9.1.9 As Built Drawings

PART 2 – PRODUCTS:

2.1 Membrane and associated membrane flashings are to be manufactured and labeled by the membrane materials manufacturer or, if supplied by a different manufacturer, approved for use by membrane manufacturer in compliance with warranty requirements.

PART 3 - EXECUTION

3.1 Timing:

3.1.1 Make all submittals in accordance with schedules specified herein.

3.1.2 Designer will be allowed a minimum of 10 calendar days following receipt of submittals for review.

3.1.3 Delays caused by tardiness in receipt of submittals shall not be an acceptable basis for extension of the Contract completion date.

3.2 Review:

3.2.1 The notations "No Exceptions Taken" or "Exceptions as Noted" shall authorize the Contractor to proceed with fabrication, purchase, or both subject to the revisions, if any, required by the Designer's review comments.

3.2.2 The Contractor shall make all revisions, as required. If the Contractor considers any revisions to constitute a change, he shall notify the Designer under the provisions of the General Conditions.

3.2.3 Only those revisions directed or approved by the Designer shall be shown on the re-submittal.

3.2.4 After a submittal has been approved by the Designer, substitution of materials, equipment and/or procedures shall not be considered unless accompanied by an acceptable explanation for the substitution.

3.3 Foreman's Statement: See exhibit “B”

EXHIBIT "B"

STATEMENT

Lakeview MS
Roof Replacement

I, ____(Name)_____, an employee of ____(Contractor)___ hereby state that I have my own personal copy of the project specifications and drawings, have thoroughly read them and have visited the work site.

By_____

Date_____

END OF SECTION

SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 Shop drawings,

1.1.1 Shop drawings, diagrams, illustrations schedules, performance charts, brochures and other data prepared by the Contractor, Subcontractor, manufacturer, supplier or distributor which illustrate some portion of the Work.

1.1.2 Submit shop drawings by transmittal letter with the following information:

1.1.2.1 Designer's Project Number

1.1.2.2 Submittal Date

1.1.2.3 Submittal Number

1.1.2.4 Project Title

1.1.2.5 Name of Contractor, Approval Date and Contractor's approval stamp/signature.

1.1.2.6 Reference to Specification Section, Paragraph and/or Drawing.

1.1.2.7 The location of the work covered by the shop drawing.

1.1.2.8 Any qualification, deviation or departure from Contract.

1.1.2.9 Any additional information required by the Specifications for the particular material being furnished.

1.1.3 Each shop drawing shall be numbered. The same numbering system shall be retained through all revisions. Each drawing shall have a clear space for the approval stamps of contractor and Designer.

1.1.4 In submitting shop drawings for approval, all associated shop drawings related to a complete assembly shall, where possible, be submitted at the same time so that each may be checked in relation to the entire proposed assembly.

1.1.5 Contractor shall prepare composite shop drawings and installation layouts, when required, to depict proposed solutions for tight field conditions. The composite shop drawings and field installation layouts shall be coordinated in the field by the Contractor for proper relationship to the work of other trades involved in the work.

1.1.6 With respect to standard manufactured items, Contractor shall submit to Designer manufacturer's illustrated cuts of the items to be furnished showing details, sizes and dimensions and all other pertinent information. Sufficient copies of cuts shall be furnished so that Designer may maintain a minimum of two copies and return to Contractor the number required for Contractor's use.

1.1.7 Contractor shall submit one reproducible print and three copies of each drawing.

1.1.8 Submit shop drawings for the following details:

1.1.8.1 Curb detail

1.1.8.2 Counterflashing details

1.1.8.3 Tapered insulation layout

1.1.8.4 Insulation fastening pattern details

1.1.8.5 Rake edge details

1.1.8.6 Internal roof drain details

1.1.8.7 Overflow drain detail

1.1.8.8 Through-wall scupper details

1.1.8.9 Overflow scupper detail

1.1.8.10 Conductor head details

1.1.8.11 Downspout details

1.1.8.12 Downspout Protector detail

1.1.8.13 Roof-to-roof expansion joint details

1.1.8.14 Roof-to-wall expansion joint details

1.1.8.15 Coping and closure details

1.1.8.16 Supplemental deck framing details at new drain locations

1.1.8.17 Drain leader details

1.1.8.18 Other details, as specified

1.2 Product Data:

1.2.1 Submit a complete description of the roofing systems listing all components and their respective manufacturer.

1.2.2 Submit each manufacturer's technical specifications and installation procedures for each major roofing component required.

1.2.3 Minimum required components include base sheet and rosin sheeting, fasteners, insulation, roof membrane, flashing and metal flashing material.

1.3 **Samples:** Submit a 6-inch long sample of each metal shape to be used on this project to Designer for approval. Metal shapes are to be constructed in accordance with approved shop drawings and will be used for establishment of quality standards during installation.

PART 2 – PRODUCTS: Not Used.

PART 3 - EXECUTION

3.1 Timing:

3.1.1 A minimum of 10 days shall be allowed for review by the Designer following his receipt of the submittal.

3.1.2 If a submittal contains more than 10 shop drawings, Contractor shall indicate which drawings must be returned within 10 days. Designer shall have an additional 10 days to return the balance of submittals.

3.1.3 Delays caused by tardiness in receipt of submittals shall not be an acceptable basis for extension of the contract completion date.

3.2 Review:

3.2.1 Review by the Designer shall be directed to the general method of construction and shall not be construed as a complete check nor shall the review relieve the contractor from responsibility for errors and/or omissions which may exist.

3.2.2 The notations "Reviewed" or "Make Corrections as Noted" shall authorize Contractor to proceed with fabrication, purchase, or both, subject to the revisions, if any, required by the Designer's review comments.

3.2.3 The Contractor shall make all revisions, as required. If the Contractor considers any required revisions to constitute a change, he shall notify the Designer under the provisions specified in the General Conditions.

3.2.4 Only those revisions directed or approved by the Designer shall be shown on the re-submittal.

3.2.5 After a submittal has been approved by the Designer, substitution of materials or equipment shall not be considered unless accompanied by an acceptable explanation as to the necessity for the substitution.

END OF SECTION

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 – GENERAL

1.1 Products specified by association or trade standards, must comply to those standards, except when more rigid requirements are specified herein or are required by applicable codes.

1.2 Brand or manufacturer names are used as standards of quality where no other appropriate reference is available. The Designer will consider substitution of materials of equal quality and properties provided a written request accompanied by substantiating data is received at least 10 days prior to Bid Date.

1.3 The date of the standard is that which is in effect as of the bid date, except when a specific date is stated.

1.4 Should there be a discrepancy between the referenced standards and these Contract documents, the latter shall govern unless written interpretation is obtained from the Designer.

1.5 Should there be discrepancies among the referenced standards, the more stringent requirements govern.

1.6 Definitions:

1.6.1 ASTM - American Society of Testing and Materials. A society formed for the development of standards on characteristics and performance of materials, products, systems and services; and the promotion of related knowledge.

1.6.2 U L - Underwriters' Laboratories. A non-profit, independent organization which tests devices, systems and materials to determine their performance to life, fire, casualty hazards and crime prevention.

1.6.3 ANSI – American National Standards Institute. A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

1.6.4 F M - Factory Mutual or Factory Mutual Research Corporation. Has a charter similar to Underwriters' Laboratories.

1.6.5 SMACNA - Sheet Metal and Air Conditioning Contractors National Association.

1.6.6 AIA - American Institute of Architects

1.6.7 NRCA - National Roofing Contractors Association.

1.6.8 SCBC – South Carolina Building Code, 2021 Edition

1.6.9 SCPC – South Carolina Plumbing Code, 2021 Edition

1.6.10 IEBC - International Existing Building Code, 2021 Edition

1.6.11 IECC – International Energy Conservation Code, 2009 Edition

1.6.12 OSHA – Occupational Safety and Health Administration

1.6.13 SCFC – South Carolina Fire Code, 2021 Edition

1.6.14 SCMC – South Carolina mechanical Code, 2021 Edition

1.6.15 NEC – National Electrical Code (NFPA 70) with SC modifications, 2020 Edition

1.6.16 ASCE 7 - Minimum Design Loads and associated criteria for buildings and other structures; most recent edition cited by referring code or reference standard.

1.6.17 SDI (QA/QC) - Standard for Quality Control and Quality Assurance for installation of steel deck; 2017.

1.6.18 SJI 100 - Catalogue of standard specifications, load tables, and weight tables for steel joists and joist girders; 2011.

END OF SECTION

SECTION 01 66 00
STORAGE AND PROTECTION

PART 1 - GENERAL

1.1 General Protections:

1.1.1 Limit size of work sections to safeguard adjacent materials, structures, etc., and to minimize dust and noise.

1.1.2 Protect existing facilities from damage during work. Do not overload existing paving, curbs, sidewalks, etc. with vehicle traffic. Do not overload new or existing construction with demolition debris, equipment, etc.

1.1.3 Plywood, minimum 3/4-inch thick, or other suitable materials shall be used to protect roof areas from damage that may be caused by concentrated equipment loads and foot traffic.

1.1.4 Roof traffic shall be confined to work areas. Contractor shall be responsible for leaks that develop in traffic areas during and after project completion.

1.1.5 Self-supporting ramps shall be used where expansion joints, area dividers, etc. are to be crossed.

1.1.6 Contractor shall protect interior operations from adverse weather during roofing operations.

1.1.7 At the end of each workday, the contractor shall apply nightly temporary tie-ins to ensure that the building is weather tight, and that newly installed materials are free from moisture and debris. Newly installed materials coming in contact with moisture and debris is grounds for rejection of materials and shall constitute the replacement of the materials with like materials at no additional cost to the Owner.

1.1.8 The Contractor will be held liable for any damages to the building, building contents, its occupancy, grounds or landscaping resulting from work under the Contract. In the event of damage, Contractor will restore property to a condition equivalent to that at the time the project started.

1.1.9 The Contractor shall keep existing drainage facilities and associated leaders/downspouts clear of debris and bitumastic materials during construction. The Contractor will be required to use elastomeric plugs to protect leaders/downspouts during demolition and re-roofing operations.

1.1.10 Prior to the start of re-roofing operations, the Contractor has the option to water test all drain leaders and lines for clogs prior the start of work. All findings shall be immediately reported to the Owner/Designer in writing for direction prior to proceedings.

1.1.10.1 Failure to perform this option, and proceeding with work shall serve as the acceptance of the existing drain leaders and lines to be functioning at one-hundred percent (100%) capacity prior to the start of re-roofing operations.

1.1.10.2 Furthermore, with this acceptance, the Contractor shall be responsible to ensure that drain leaders and lines are functioning at one-hundred percent (100%) capacity prior to the Final Payment at no additional cost to the Owner.

1.1.11 Prior to the start of re-roofing operations, the Contractor shall provide Owner personnel with plastic bags/tarps which will be used by personnel to protect televisions, computers, and other associated equipment during the period of time that re-roofing operations are occurring. Bags/tarps shall be provided a minimum of one week prior to the start of re-roofing operations. Costs for providing such materials shall included in the Base Bid.

Contractor will still be required to provide any other additional protection to interior items as may be

deemed necessary to comply with the requirements of the Contract Documents.

1.1.12 Schedule of Interior Protections:

1.1.12.1 The contractor bears the responsibility to locate any conduits that are in the decking flutes prior to the start of the work. The contractor shall, to the full extent possible, not engage these conduits with screws, fasteners, etc. Should power be lost due to penetration of a conduit, the Contractor bears the responsibility to locate and repair the conduit and/or enclosed wiring to the original condition so as to restore power to the Owner. Cost associated with these repairs shall be borne by the Contractor at no additional cost to the Owner.

(a) Repairs to wiring, electrical equipment, and accessories under this paragraph shall be performed by an electrical contractor licensed to perform such work in the state of South Carolina with a minimum of 5 years experience in this type of work.

1.1.13 Exterior Protections:

1.1.13.1 Provide construction trailer, if desired, and material staging at location provided by the Owner at the pre-bid meeting.

1.1.13.2 Maintain a clean construction area in fencing. Maintain a clean material staging area in fencing. No spills, splatter, or residue shall remain on tarmac, roads or grounds.

1.2 Safety Site Plans:

1.2.1 The Contractor shall install and maintain temporary fall protection systems for this type of work in accordance with the following standards:

1.2.1.1 29 CFR 1910 - OSHA

1.2.1.2 29 CRF 1926 - OHSA

1.2.1.3 ANSI/IWCA I-14.1

1.2.1.4 ANSI/ASSE Z359.0-2007

1.2.1.5 ASME A120.01-2008

1.2.2 The Contractor shall submit a site-specific safety plan that shall outline safety precautions that shall be in place to protect workers, buildings, persons, vehicles, structures, and any other items that may be affected or otherwise endangered during the work. This shall list techniques, materials, safety personnel, and precautions that shall be used to achieve a safe working environment. Include sketches, plans, and diagrams, as necessary, for assessment with the safety plan. This safety plan shall be submitted to the Owner for approval with the bid. Failure to submit a safety plan shall result in disqualification of the bid and the bid shall be labeled “non-responsive”. At a minimum, this safety plan shall include:

1.2.2.1 General Safety requirements.

1.2.2.2 Protocol for providing a safe working environment for Contractor Employees, in accordance with Paragraph 1.1.3 above.

(a) Temporary fall restraint systems and anchorages,

(b) Warning lines and barricades,

(c) Safety meetings and minutes.

1.2.2.3 Wind speed working conditions, and protections for temporary roofing in high speed events.

1.2.2.4 Protocol for fire safety,

(a) Equipment checklist for proper operation,

(b) Fire extinguisher locations for every open flame,

(c) Wind requirements for open flames,

(d) Monitoring any open flame work for subsequent combustion.

1.2.2.5 Protocol for night/pre-dawn work, including foot-candle lighting, safety monitor per number of workers, barricades encapsulating work areas, 100% tie-in outside of barricaded work area, etc.

1.2.2.6 Protocol for deviations from submitted safety plan on a temporary, as needed basis.

Note: This safety plan schedule outlines minimum requirements, and this plan is subject to expansion and approval by the Owner.

1.2.3 Protect existing facilities from fire as a result of construction operations. Contractor shall provide suitable and adequate fire extinguishers conveniently located at staging areas, storage areas and at areas or equipment where an open flame is being used. Competent operators shall be in attendance at all times and shall be properly trained or instructed in fire protection.

1.2.3.1 At each location where an open flame is used, Contractor shall provide a watchman with a suitable fire extinguisher.

1.3 Material Protection:

1.3.1 Products shall be transported by methods which avoid damage. Damaged material shall be subject to rejection by the Designer.

1.3.2 Store materials off the ground covered with tarps. Factory-applied wrappings are not acceptable.

1.3.3 Wet materials shall be removed from the project site.

1.3.4 Materials that are temperature sensitive are to be stored in strict accord with manufacturer's written instructions.

1.4 Storage:

1.4.1 Contractor shall be responsible for proper storage of equipment, materials and devices furnished by himself and/or his subcontractors and suppliers.

1.4.2 To the maximum extent possible, the Contractor shall not store combustible or flammable materials inside the facility.

1.4.3 All storage areas are subject to approval by the Owner or his authorized representative.

PART 2 – PRODUCTS: Not Used.

PART 3 – EXECUTION: Not Used.

END OF SECTION

SECTION 01 74 00
CLEANING

PART 1 - GENERAL

1.1 Description: To maintain the buildings and site in a clean condition throughout the duration of the project. The Contractor shall comply with all requirements for cleanliness described in other sections of these Specifications.

PART 2 – PRODUCTS

2.1 The Contractor shall provide all required manpower, material and equipment to maintain the specified standard of cleanliness.

2.2 Contractor shall use only those materials and equipment which are compatible with the surface being cleaned as recommended by the manufacturer or approved by the Designer.

PART 3 - EXECUTION

3.1 Progress Cleaning:

3.1.1 Stored items shall be kept in an orderly arrangement allowing maximum access and shall not impede drainage or traffic.

3.1.2 Scrap, debris, waste material and other items shall not be allowed to accumulate and shall be removed from the roof daily.

3.1.3 Contractor shall protect new roofing membrane from dirt and debris during the demolition of the remainder of the roofing. Areas with new roofing membrane shall be kept clean and free of debris during the duration of the re-roofing.

3.1.4 Streets, parking lots, walks and grounds connecting to the project area shall be protected from deposits of mud, sand, stone, litter, or debris in any form, and this protection shall be the responsibility of the Contractors. All mud collected on vehicle wheels must be cleaned off before leaving the construction area. Should any mud or debris collect on the streets from the construction project, this shall be removed immediately before becoming a traffic hazard.

3.1.5 Contractor shall provide storage containers for all items awaiting removal from the site. Storage containers shall be approved by the Designer.

3.1.6 Dust, dirt, and debris created by project construction shall be properly contained or controlled by the Contractor.

3.1.7 The Contractor shall conduct daily inspections to ensure that the requirements for cleanliness are met.

3.1.8 At locations where the Contractor accesses the site or designated changing areas, the Contractor shall maintain a clean site. The Contractor shall protect the Owners' building from damage, staining, soiling, roofing materials, and roofing debris. This shall also include, at a minimum, the weekly cleaning of these areas. "Clean" shall be interpreted as meaning the level of cleanliness generally attainable by skilled cleaners using commercially available building maintenance equipment and materials.

3.1.9 Work may be stopped or delayed by the Owner should the Contractor fail to take appropriate measures to clean the site daily. Extensions to the project completion date for such delays will not be approved.

3.1.10 Contractor shall visually inspect all exterior surfaces and remove all traces of dirt, waste materials, smudges, splashed materials, and other foreign matter. The Designer may require that light sandblasting

or other cleaning be performed at no cost to the Owner. If such cleaning is required, the Contractor shall take all necessary precautions to prevent damage to adjacent materials, property, and vegetation.

3.1.11 The contractor shall make every effort to protect the vehicles on site from becoming unclean, from construction debris and from damage. The contractor is responsible to pay for vehicle cleaning and repairs necessary due to construction related activity.

3.2 The Contractor shall inspect all arrangements of materials stored on the project site on a weekly minimum basis and shall service all arrangements in accordance with the requirements of Paragraph 3.1.1 of this section.

3.3 Final Cleaning:

3.3.1 Except as specifically provided otherwise, "clean" shall be interpreted as meaning the level of cleanliness generally attainable by skilled cleaners using commercially available building maintenance equipment and materials.

3.3.2 All tools, equipment, materials, scrap, debris and waste shall be removed from the project site and a final progress cleaning conducted in accordance with this Section.

3.3.3 Unless otherwise directed by the Designer, the Contractor shall clean all adjacent areas on the site and completely remove all resultant debris.

3.3.4 The Contractor shall clean out all gutters and associated downspouts of any debris prior to final acceptance by the Owner. Such work shall be performed at no additional cost to the Owner.

3.3.5 Restore grass or planted areas by filling ruts, raking, seeding, planting, sodding, and fertilizing. Sweep paved areas.

3.3.6 Contractor shall visibly inspect all exterior surfaces and remove all traces of dirt, waste materials, smudges, splashed materials and other foreign matter. The Designer may require that light sandblasting or other cleaning be performed at no cost to the Owner. If such cleaning is required, the Contractor shall take all necessary precautions to prevent damage to adjacent materials, property and vegetation.

3.3.7 Prior to final inspection, the surface of the membrane shall be cleaned of all debris, dust, and foreign material. This may require the use of water, detergents, and other cleaning agents approved by the roofing system manufacturer. Contractor will be responsible for providing the necessary items to perform this task. Do not use any abrasive pads that can score the polymer.

3.3.7.1 During the work, the Contractor or subcontractor shall not be allowed to stage materials on newly installed roofing. The Contractor shall phase work and stage necessary materials at existing roofing areas. Any damage to new membrane during construction shall result in repairs to the membrane at no additional cost to the Owner, and large areas shall result in the removal and replacement of new membrane at no additional cost to the Owner.

END OF SECTION

SECTION 01 77 00
PROJECT CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 Description: To provide a specific format for substantial completion and final inspection.

1.2 Related Work:

1.2.1 Completion: Waiver of Claims, General Conditions

1.2.2 Section 01 74 00 – Cleaning

1.2.3 Section 01 78 39 – Project Record Documents

1.2.4 Section 01 78 36 – Warranty and Guarantees

1.2.5 Closeout Submittals Required for Trades: Respective Section of Specification

1.2.6 Substantial Completion: Conditions of the Contract.

1.2.7 Final Payment: General Conditions

1.3 Quality Assurance: All documents submitted to the Owner shall be signed by a person authorized to endorse Contracts on behalf of the Contractor

PART 2 – PRODUCTS: Not Used.

PART 3 - EXECUTION

3.1 Substantial Completion:

3.1.1 The Contractor shall submit written certification to the Owner when the project or designated portion of the project is substantially complete. A list of major items to be completed or corrected shall be stated.

3.1.2 The Owner will inspect within ten (10) days after receipt of certification and issue a Certificate of Substantial Completion containing:

3.1.2.1 The Date of Substantial Completion.

3.1.2.2 The Contractor's list of items to be completed or corrected and any amendments by the Owner or Designer.

3.1.2.3 The time to be allowed for the Contractor to complete or correct listed items.

3.1.2.4 The time and the date Owner will assume possession of the work or designated portion thereof.

3.1.2.5 The signatures of the Owner, Designer and Contractor.

3.1.3 The Contractor shall then complete or correct those items so listed within the designated time and inform the Owner upon completion.

3.1.4 Should the Owner determine that the work is not substantially complete, the Owner shall immediately notify the Contractor in writing stating reasons. The Contractor shall then complete the work and send a second written notice to the Owner certifying that the project, or designated portion thereof, is

substantially complete. The Owner will re-inspect the work within ten (10) days after receipt of certification.

3.2 Final Inspection:

3.2.1 The Contractor shall submit written certification to the Owner that:

3.2.1.1 The Contract Documents have been reviewed.

3.2.1.2 Work has been completed in accordance with the Contract Documents.

3.2.1.3 The project has been inspected for compliance with the Contract Documents.

3.2.1.4 The project is ready for final inspection.

3.2.2 The Owner will make a final inspection within ten (10) days after receipt of certification.

3.2.3 Should the Owner determine that the work is finally complete in accordance with the requirements of the Contract Documents, the Owner will request that the Contractor submit the appropriate project closeout documentation.

3.2.4 Should the Owner determine that the work is not finally complete, the Owner will immediately notify the Contractor in writing stating reasons. The Contractor shall then take immediate measures to remedy the stated deficiencies and send an additional written notice to the Owner certifying that the work is complete. The Owner will re-inspect the work within ten (10) days after receipt of certification.

3.3 Re-Inspection Costs: Should the Owner be required to perform additional inspections due to noncompliance of work with the certifications of the Contractor, the Contractor shall compensate the Owner for such additional services. Such costs will be deducted from final payment to the Contractor.

3.4 Closeout Submittals:

3.4.1 Project Record Documents: As required by Section 01 78 39

3.4.2 Warranties: As required by Section 01 78 36

3.4.3 Evidence of payment and release of liens: Waiver and Release Upon Payment – Final.

3.4.4 Consent of Surety

3.4.5 Contractor's Affidavit of Payment of Debts and Claims: AIA G706.

3.4.6 Contractor’s Affidavit of Release of Liens: AIA G706A.

3.4.7 The Contractor shall be responsible for proper execution of all submittals required by this Section prior to delivery to the Owner through the Designer.

3.4.8 The Contractor shall submit a final statement of accounting to the Owner. The statement shall reflect all adjustments including, but not limited to:

3.4.8.1 Original Contract sum.
3.4.8.2 Change Orders noting such items as:

(a) Unit Prices

(b) Cash Allowances

(c) Deductions for Uncorrected Work

(d) Deductions for Re-Inspection Payments

(e) Other Adjustments

3.4.8.3 Total adjusted Contract sum

3.4.8.4 Previous payments

3.4.8.5 Remaining amount due

3.4.9 The Owner will prepare a final Change Order reflecting approved adjustments not previously noted.

3.5 Final Application for Payment:

3.5.1 The Contractor shall submit final application for payment in accordance with the specifications.

3.5.2 The Owner will issue a final certificate in accordance with the specification.

END OF SECTION

SECTION 01 78 36
WARRANTIES

PART 1 – GENERAL

1.1 Upon completion of the work and prior to the final payment, the Contractor shall submit the required contractor's warranty and/or manufacturer's guarantee, as required by this Section.

1.2 Submittals: Submit all items required by this Section as part of project record documents, Section 01 78 39.

1.3 Guarantees and Bonds:

1.3.1 Contractor:

1.3.1.1 Use the attached guarantee form.

1.3.1.2 Roofing Warranty: The Contractor shall warrant the materials and workmanship of all systems of the project against leakage and against defects due to faulty materials, workmanship, and contract negligence for a period of five (5) years following Final Acceptance of the project.

1.3.1.3 The Contractor and the Owner's representative shall conduct an inspection approximately 30 days prior to the end of the Contractor's guarantee to determine the present physical condition of the roofing system and window system. The Owner's representative shall then submit a written report as to the findings of this inspection, and the Contractor, at his own expense, shall repair any defects covered under the scope of this contract.

1.3.2 Roofing Manufacturer Guarantees:

1.3.2.1 General – Guarantees shall not contain conditions limiting the manufacturer's obligations due to:

a) Receipt of payments from the roofing contractor.

b) The system having been installed in accordance with the manufacturer's specifications and procedures.

1.3.2.2 TPO or PVC (80-mil) Membrane Manufacturer's Guarantee: All Roof Areas **(Additive Alternate No. (1)**

a) The Contractor shall include in the base bid the cost of the manufacturer's 30-year no dollar limit material and workmanship total system guarantee. The guarantee must not require Owner's signature to activate.
   i. Warranty shall include 72-mph wind rider at no additional cost to the owner.

b) The manufacturer shall agree that the work covered under this contract shall remain free from water penetration and material defects caused by defective workmanship or materials for a period of thirty (30) years from the date of Final Acceptance by the Owner. The Contractor's guarantee shall neither replace nor negate any agreement furnished by the manufacturer.

1.3.2.3 TPO or PVC (60-mil) Membrane Manufacturer's Guarantee:

a) The Contractor shall include in the base bid the cost of the manufacturer's 20-year no dollar limit material and workmanship total system guarantee. The guarantee must not require Owner's signature to activate.

i. Warranty shall include 72-mph wind rider at no additional cost to the owner.

b) The manufacturer shall agree that the work covered under this contract shall remain free from water penetration and material defects caused by defective workmanship or materials for a period of twenty (20) years from the date of Final Acceptance by the Owner. The Contractor's guarantee shall neither replace nor negate any agreement furnished by the manufacturer.

1.3.2.4 Metal Flashing Manufacturer – Prior to final payment, the contractor shall furnish one original and three copies of the metal flashing manufacturer's twenty (20) year finish guarantee for factory applied finishes.

1.3.2.5 Sealant Manufacturer - Prior to final payment, Contractor shall submit one original and three (3) copies of the sealant manufacturer's twenty (20) year premium warranty to the Owner.

a) Where a problem has arisen with the material performance of a product that has been approved by the sealant manufacturer as a part of the work under this specification, but is not manufactured by the waterproofing or sealant manufacturer, and a product defect or failure occurs, even if the failure/defect does not result in leaks through the sealant and/or facility, the waterproofing and sealant manufacturer shall work in concert with the contractor to resolve such issues to the satisfaction of the Owner at no additional cost to the Owner.

b) In the event that the sealant manufacturer should supply materials that they do not manufacture, to include such items as primer, and/or cleaning products; these items shall be included in the Guarantee coverage.

1.3.3 Emergency repairs to defects and leaks shall be performed within 24 hours of receiving notice from Owner. As soon as weather permits, permanent repairs and restoration of affected areas shall be accomplished in a manner in conformance with the original Contract requirements. This work shall be done without additional cost to the Owner, except if it is determined that such leaks and effects were caused by abuse, lightning, hurricane, tornado, hailstorm, or other unusual phenomena.

1.3.4 The warranties shall also state that the Owner has the right, at any time during the five-year Contractor's warranty period to make emergency repairs to protect the contents of the building or the building itself from damage due to leaking. The cost of emergency repairs made during the five-year period of the warranty shall be borne by the Contractor and action by the Owner shall not invalidate the warranty.

1.3.5 Starting dates of all warranties shall be the date of the final inspection and Owner acceptance which the Owner, Designer, Contractor and Manufacturer agree that all work has been completed in substantial compliance with the plans and specifications of the project.

1.3.6 All Guarantees shall be governed by and construed in accordance with the laws of the State of South Carolina.

1.3.7 No guarantee shall require dispute resolution to take place in any court other than those courts having jurisdiction over the site of the project.

1.3.8 All Guarantees shall be issued bearing a signature of an officer of the company and shall not require the signature of the Owner nor Designer.

PART 2 – PRODUCTS: Not used

PART 3 – EXECUTION: Not used

END OF SECTION

EXHIBIT "C"

(Print Warranty Body on Contractor's Company Letterhead)

CONTRACTOR'S ROOF WARRANTY

1. Known all men by these presents, that we, *Contractor shall insert company name here* (Contractor), having installed insulation, roofing, flashings, and sheet metal work, and having accomplished certain other work on Lakeview Middle School, All Roof Areas, 3801 Old Buncombe Rd, Greenville, South Carolina 29617 under Contract between Greenville County Schools and (Contractor) warrant to Greenville County Schools, with respect to said work that for a period of five (5) years from date of final acceptance of said work by Greenville County Schools, the roofing including insulation, roofing membrane, flashings, and sheet metal work, shall be absolutely watertight and free from all leaks, provided however that the following are excluded from this warranty:

   a) Defects or failure resulting from abuse by the Owner.
   b) Defects in design involving failure of the structure, load-bearing walls, and/or foundations.
   c) Damage caused by fire, tornado, hail, hurricane, acts of God, wars, riots, and/or civil commotion.

2. We agree that should any leaks occur in the roofing, we will promptly remedy said leaks in a manner to restore the roof to a watertight condition by methods compatible to the system and acceptable under industry standards and/or general practice.

3. We further agree that for a period of five years from date of final acceptance referred to above, we will make repairs at no expense to the Owner, to any defects which may develop in the work including, but not limited to, blisters, wrinkles, ridges, splits, warped insulation, and loose flashings, in a manner compatible to the system and acceptable under industry standards and general practice.

4. We also agree that the Owner has the right, at any time during the five-year warranty period, to make emergency repairs to protect the contents of the building or the building itself from damage due to leaking. The cost of emergency repairs made during the five years of the warranty period shall be borne by the Contractor and action by the Owner shall not invalidate the warranty.

IN WITNESS WHEREOF, we have caused this instrument to be duly executed, this __day of _____, 2024.

_____ by_____
Contractor President

_____
Notary Public

END OF EXHIBIT "C"

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 Summary: To maintain an accurate record of the project throughout its duration. Items to be noted include, but are not necessarily limited to:

1.1.1 Contract Documents

1.1.2 Addendum

1.1.3 Change Orders

1.1.4 Field Orders and Instructions.

1.1.5 Construction Schedule.

1.1.6 Shop Drawings

1.1.7 Product Samples

1.1.8 Progress Reports

1.2 Quality Assurance:

1.2.1 The Contractor shall delegate responsibility for maintenance of the record documents to one person on the Contractor's staff as approved by the Designer.

1.2.2 All entries shall be made within 24 hours after receipt of information.

1.3 Submittals: The Contractor shall submit the final record documents to the Designer for approval prior to submitting a request for final payment. Submit two copies of "as-built" documents to Designer with letter of transmittal indicating date, project title, Contractor's name and address, list of documents, and signature of Contractor.

1.4 Product Handling: Contractor shall take all necessary precautions to protect the record documents from deterioration loss and damage until completion of the work and transfer of the recorded data to the final record documents.

PART 2 – PRODUCTS: Not Used.

PART 3 – EXECUTION: Not Used.

END OF SECTION

DIVISION 2

EXISTING CONDITIONS

SECTION 02 41 13
SELECTIVE DEMOLITION AND PREPARATIONS

PART 1 - GENERAL

1.1 Related Work:

1.1.1 Section 01 50 00 – Temporary Facilities and Controls

1.1.2 Section 01 60 00 – Product Requirements

1.1.3 Section 01 66 00 – Storage and Protection

1.1.4 Section 06 10 53 – Miscellaneous Rough Carpentry

1.2 Protection: Refer to Section 01 66 00.

PART 2 - PRODUCTS

2.1 Sheet Metal: 20-gauge galvanized steel.

2.2 SODIUM HYPOCHLORITE 5% SOLUTION: Clorox, As Manufactured By The Clorox Company, 1221 Broadway Oakland, California 94612, or approved equal prior to bid.

2.3 Steel plate: Minimum 20-gauge galvanized with pre-drilled holes for fasteners and plates.

2.4 Fasteners and plates: For securing steel plate to concrete deck: Structural concrete deck plate and fastener system such as JM “Structural Concrete Deck Fasteners and Plates”, #14 fasteners with knurled thread, and minimum 3-inch galvalume plates; fastener length as necessary to penetrate 1-inch minimum into roof deck, manufactured by Johns Manville, Denver, CO, or approved equal.

2.5 Bonding agent and reinforcement protection: Sika “Armatec 110 EpoCem”, manufactured by Sika Corporation, Lyndhurst, NJ, or approved equal.

2.6 Concrete patch material: Rapid hardening, early strength gaining, cementitious, patching material for concrete, complying with ASTM C 928; such as “SikaQuick 1000”, manufactured by Sika Corporation, Lynhurst, NJ, or approved equal.

2.7 Metal Deck Primer: Kem Kromik as manufactured by Sherwin Williams or approved equal.

2.8 Metal Deck: ASTM A 653, galvanized G-90 deck, manufactured in accordance with the requirements of the Steel Deck Institute, Inc. for wide rib (Type B). Minimum section properties:

2.8.1 Yield strength = 33 ksi.

2.8.2 Thickness: 22 gauge.

2.8.3 Panel Coverage: minimum 36 inches.

2.9 Deck-To-Joist Fastener: ASTM A240, 410 stainless steel, self-drilling minimum #12 stainless steel screw with a nominal head diameter of 0.430 inches. Screws shall penetrate the substrate a minimum of 1-1/2 inch.

2.10 Deck Side Lap Screws: ASTM A240, 410 stainless steel, self-drilling minimum #10 stainless steel screw with a nominal head diameter of 0.415 inches. Screws shall penetrate the substrate a minimum of 1 inch.

2.11 Masonry Fastener:

2.11.1 Masonry Anchor, minimum 1-1/4 inch into substrate, as manufactured by OMG Roofing Products

2.11.2 Tapcon ¼" x minimum 1-1/4" in the substrate, as manufactured by Buildex.

2.11.3 Roofing Spike, minimum 1-1/4 inch into substrate, as manufactured by Powers Fasteners.

2.11.4 Approved equal prior to bid.

2.12 Wood Screws: #12 double-coated galvanized steel screws or stainless steel self-tapping wood screws that shall be able to resist any galvanic action that may be able to develop between the nail and the pressure treatment. The use of a lesser quality screw will not be approved. Screws shall be of sufficient length to penetrate a minimum of 1-1/2-inches into the substrate.

2.13 Wood Nails: For securing new lumber to new lumber or new plywood/OSB to new lumber, double-coated galvanized steel, or stainless-steel ring shank nails to penetrate a minimum of 1-1/2 inches into the substrate but not smaller than 8d nails. Use 16d nails where material being secured is 1-1/2-inches to 2-inches thick.

PART 3 - EXECUTION

3.1 Demolition:

3.1.1 Refer to Section 01 11 00 Summary of Work.

3.1.2 The removal of roof-mounted equipment and/or curbs, as identified either on plans and/or marked on the roof, shall be included in the Base Bid.

3.1.3 The Designer and Contractor shall document the actual quantities removed for materials bid on a unit price basis.

3.1.4 All existing roof mounted equipment shall be lifted or removed so that existing flashings can be totally removed.

3.1.5 Remove only as much material as can be totally replaced in the same day.

3.1.6 Demolition shall be performed by personnel familiar with the replacement of materials being used.

3.1.7 Demolition adjacent to areas to remain shall be performed in a neat manner with straight lines to facilitate tie-ins of replacement materials. Contractor shall review tie-in methods with the Designer for approval. Designer has final approval of such methods.

3.1.8 Excessive demolition, as determined by the Owner's representative, shall be replaced with equal materials at the Contractor's expense in accordance with the General Conditions of the Contract.

3.1.9 No demolition shall be performed if the chance of precipitation is 40% or more as reported by the nearest office of the National Weather Service.

3.2 Preparations:

3.2.1 Prior to the installation of any new roofing, flashings, metal flashings, any other miscellaneous items, the Contractor shall clean surfaces of all dust, dirt, and other foreign materials.

3.2.2 Inspect the deck carefully. If, in the Contractor's opinion, there are structural concrete deck areas that require repair and/or replacement, notify the Designer. Do not proceed with any repairs or replacement

until directed by the Designer.

3.2.3 Inspect the deck carefully. If, in Contractor's opinion, there are metal deck areas that require repair and/or replacement, notify the Designer. Do not proceed with any repairs or replacement until directed by the Designer.

3.2.4 Prior to the installation of any new roofing materials, extend all existing soil pipe vents through the roof to a minimum height of 8 inches (or as required by local plumbing codes) above the finished roof surface. Furnish a piece of PVC piping that will fit snugly into the existing soil pipe vent and shall extend into the pipe a minimum of 12 inches. Provide a second PVC pipe that fits snugly around the smaller PVC pipe and shall provide a minimum 8" height above the finished roof surface. The smaller pipe height shall match the outer pipe. Cement the two PVC pipes together with an approved pipe solvent/glue. Insert the extension into the existing soil pipe vent.

Note: The placement of a PVC pipe extension directly on top of the existing soil pipe vent without the support method described above shall be removed by the Contractor and new extensions approved by the Designer shall be installed at no additional cost to the Owner.

3.2.5 **(Unit Price No. 1)** Where wood blocking or curbs are damaged or deteriorated, remove existing wood blocking to a point 6 inches beyond the damage and/or deterioration, and repair and/or replace with new wood blocking to match existing. Secure new blocking to the substrate using specified screws at spacings not to exceed 12 inches on-center, staggered. Pattern.

3.2.5.1 Contract shall include 5,000 board feet of wood blocking replacement in the Base Bid.

3.2.6 **(Unit Price No. 2)** Where steel decking is rusted but remains structurally sound, wire brush deck units so that all rust is removed. Paint with specified metal primer, or approved equal, and allow to dry before proceeding with the installation of new materials.

3.2.6.1 Contract shall include 4,000 square feet of metal deck priming in the Base Bid.

3.2.7 **(Unit Price No. 3)** Where steel decking is damaged or rusted through in small areas (less than 6-inches in any direction), clean deck of rust with a wire brush. Paint with specified metal primer or approved equal. Install over the damaged area the specified sheet metal that shall be secured to the existing steel deck with specified deck screws located 1 inch from the perimeter of the plate, and at 6 inches on center. Extend the new steel plate a minimum of 6 inches onto the surface of the existing steel deck beyond the damaged area.

3.2.7.1 Contract shall include 4,000 square feet of sheet metal installation in the Base Bid.

3.2.8 **(Unit Price No. 4)** Where steel decking is severely damaged or has deteriorated over large areas (greater than 6-inches in any direction), remove the entire existing deck unit and install new specified decking. Lap new deck units over the existing in the same manner as originally installed. Secure to structural framing with specified screws at Steel Deck Institute 36/4 patterns each available framing member and not more than 24 inches on center at side laps using specified side lap screws. At the perimeter, specified deck fasteners shall be applied at spacings not to exceed 6 inches on-center along the parapet framing.

3.2.8.1 Contract shall include 2,000 square feet of sheet metal installation in the Base Bid.

3.2.9 **(Unit Price No. 5)** At those locations where side lap screws have not been installed or side lap screws exceed 30-inches on-center, furnish and install new self-tapping sheet metal screws at spacings not to exceed 30-inches on-center. Contractor shall submit technical data on the proposed screws before the start of this phase of the work.

3.2.9.1 Contract shall include the installation of 2,000 side laps screws in the Base Bid.

3.2.10 **(Unit Price No. 6)** At those locations where existing welds have broken from the top of the supporting members or have not been installed, furnish and install new screws in accordance with Drawing A-501. Welding is not an acceptable means of attaching/re-attaching the deck to the supporting member. Fasteners shall penetrate the structural membrane a minimum of 1-1/2 inches.

3.2.10.1 Contract shall include the installation of 2,000 Deck-to-Joist Fasteners in the Base Bid.

3.2.11 **(Unit Price No. 7)** Where concrete slab is damaged or deteriorated on the surface but the substrate is structurally sound, remove the damaged or deteriorated existing concrete to an area of sound concrete. Furnish and install new concrete repair mortar over the substrate in accordance with the repair mortar manufacturer's written instructions.

3.2.11.1 Contract shall include 100 square feet of concrete repair mortar in the Base Bid.

3.2.12 **(Unit Price No. 8)** Where structural concrete roof deck is damaged or deteriorated for an area less than 6 inches in diameter on the largest side, install over the damaged area the specified sheet metal that shall be secured to the existing deck with specified masonry anchors located 1 inch from the perimeter of the plate, and at 6 inches on center. Extend the new sheet metal a minimum of 6 inches onto the surface of the existing concrete deck beyond the damaged area. Where concrete deck is damaged at areas larger than 6 inches on any side, contact the designer and owner. Do not proceed with repairs or roofing until directed.

3.2.12.1 Contract shall include 100 square feet of sheet metal-over-concrete repair in the Base Bid.

3.2.13 **(Unit Price No. 9)** The contractor shall include in the base bid an Owner's Contingency in the amount of Fifty Thousand Dollars ($50,000).

3.2.14 Contractor shall include allowances as indicated on the Bid Form in the Base Bid. Contract will be increased at unit price rates for unit price work that exceeds allowances. Contract will be reduced for unused unit price work at the bid unit price rate. Owner reserves the right to negotiate lump sum modifications to the contract for bulk unit price work.

3.2.15 Cost associated with any necessary removals at roof drains to install new roof drains and/or drain sumps shall be included in the Base Bid.

3.2.16 Abandoned Penetrations at Metal Roof Decks:

3.2.16.1 At all abandoned roof penetrations, less than 6 inches in diameter, secure a piece of 20 ga. galvanized steel to the existing deck at spacings not to exceed 6 inches on center and located approximately one inch from the edge of the opening. Sheet metal shall be secured to the deck with specified deck screws. The sheet metal shall extend onto the existing deck a minimum of 6 inches.

3.2.16.2 At abandoned openings, larger than 12 inches on any side but less than 24 inches, furnish and install new steel decking which matches the existing and install so that the ends and sides extend past the edges of the existing deck a minimum of 12 inches. The ends of the new steel deck shall extend over a structural member. Secure the new deck to the existing deck with specified deck screws at spacings not to exceed 6 inches on-center located approximately 6 inches from the opening on all sides. The ends of the new deck shall be secured to the existing structural supports using specified deck screws at Steel Deck Institute 36/7 patterns. Install specified side lap screws along the side laps at spacings not to exceed 30 inches on-center.

3.2.16.3 At abandoned openings, larger than 24 inches on any side, furnish and install new steel decking which matches the existing and install so that the new deck unit is supported by a minimum of three structural supports. Ensure that the new deck section is "nested" tightly in the existing,

which may require the removal of existing deck fasteners or grinding down existing welds. Secure the new deck to each structural member with specified deck screws at Steel Deck Institute 36/7 patterns. At side laps, furnish and install a minimum of 3 specified side lap screws between each structural member.

3.2.17 Abandoned Penetrations at Structural Concrete Roof Decks

3.2.17.1 At abandoned roof penetrations are less than 12 inches in diameter, secure a piece of 20 ga. galvanized steel to the existing concrete decking with specified masonry anchors at spacings not to exceed 6 inches on center and located approximately one inch from the edge of the sheet metal. The sheet metal shall extend onto the existing structural concrete deck a minimum of 6 inches in all directions.

3.2.17.2 At abandoned openings, less than 12 inches in diameter on the largest side, secure a piece of 20 ga. galvanized steel to the existing structural concrete decking using a continuous bed of the specified epoxy adhesive down the length of the plate edges in accordance with the manufacturer's written instructions. The sheet metal and adhesive bed shall extend onto the existing structural concrete deck a minimum of 6 inches in all directions.

3.2.17.3 At abandoned roof penetrations are more than 12 inches in diameter, secure a piece of 1/8" thick steel plate to the existing structural concrete decking with specified masonry anchors at spacings not to exceed 6 inches on center and located approximately one inch from the edge of the plate. The plate shall extend onto the existing structural concrete deck a minimum of 6 inches in all directions.

3.2.17.4 At concrete roof deck areas, at abandoned openings larger than 12 inches on any side, furnish and install new minimum Z-purlins that shall extend onto the roof deck a minimum of 6 inches, down into the opening a minimum of 1-1/2" and into the opening a minimum of 6 inches on all sides. At a minimum, the Z-purlin shall be able to support the new steel deck ends on all sides. Secure the Z-purlins to the concrete roof deck using a continuous bed of the specified epoxy adhesive down the length of the purlin in accordance with the manufacturer's written instructions. Furnish and install new specified steel decking supported by the Z-purlins on all sides. The deck flutes shall extend across the shortest pans. Secure the new deck to the new Z-purlins with specified deck screws at spacings not to exceed 6 inches on center. At any side laps, furnish and install a minimum of 3 specified side lap screws.

3.2.18 Cost associated with the removal of any abandoned equipment as identified on plans and/or on the roof shall be included in the Base Bid.

3.2.19 Raise, scrape, prime and paint existing gas lines safety yellow.

3.2.20 Scrape, prime, and paint existing roof access ladders. Color to match coping selection.

3.2.21 Remove all existing splash blocks, furnish and install new heavy rubber splash blocks at all downspout locations.

END OF SECTION

DIVISION 6

WOOD, PLASTICS, AND COMPOSITES

SECTION 06 10 53
MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 Description: Installation of blocking and/or curbs, as specified herein.

1.2 Related Work:

1.2.1 Section 02 41 13 – Selective Demolition and Preparations

1.2.2 Section 07 22 16 – Roof Board Insulation

1.2.3 Section 07 54 19 – Polyvinyl Chloride (PVC)

1.2.4 Section 07 54 23 – Thermoplastic Polyolefin (TPO) Roofing

1.2.5 Section 07 60 00 – Flashing and Sheet Metal

1.2.6 Section 22 14 00 – Roof Drains

1.3 Submittals: In accordance with Section 01 33 00 of this Specification.

1.4 Environmental Conditions: Material installation shall proceed only when weather conditions are in compliance with the applicable manufacturer's recommendations for installation and no precipitation is imminent. Materials installed during adverse weather conditions shall be subject to removal and replacement with new materials at no additional cost to Owner.

1.5 Warranty: In accordance with Section 01 78 36 of this Specification.

PART 2 - PRODUCTS

2.1 Non-Structural Wood Blocking: Nominal 2-inch-thick maximum, nominal widths as specified, shop pressure-treated for above ground contact. Do not use oil-based preservatives.

2.2 CD-X Exterior Grade Plywood: Nominal 1-inch-thick maximum, three-ply minimum.

2.3 Wood Fiber Tapered Edge Strips: ASTM C208, Type II, Grade 1 (Built-Up Roofs), C209. Approved for use by approved roofing system manufacturer.

2.4 Screws: #12 double-coated galvanized steel screws or stainless-steel self-tapping wood screws that shall be able to resist any galvanic action that may be able to develop between the nail and the pressure treatment. The use of a lesser quality screw will not be approved. Screws shall be of sufficient length to penetrate a minimum of 1-1/2-inches into the substrate. Space screws no more than 12-inches on-center, unless specified otherwise.

2.5 Nails: For securing new lumber to new lumber or new plywood/OSB to new lumber, double-coated galvanized steel or stainless-steel ring shank nails are to be used to penetrate a minimum of 1-1/2-inches into the substrate but not smaller than 10d nails. Use 16d nails where material being secured is 1-1/2-inch to 2-inches-thick. Space nails no more than 12-inches on-center unless specified otherwise.

2.6 Anchor Bolts: 1/2-inch-diameter, length to embed in concrete a minimum of 8-inches, with appropriately sized nuts and washers. Space bolts no more than 24-inches on-center unless specified otherwise.

2.7 Toggle Bolts: Nominal 1/2-inch-diameter threaded fasteners with steel toggle-type clamps. Fasteners and toggles to have factory-applied corrosion resistant coating. Lengths as required to allow engagement of the toggle clamp.

Space bolts no more than 18-inches on-center unless specified otherwise.

2.8 Masonry Fastener: Space fastener no more than 12-inches on-center unless specified otherwise.

2.8.1 Masonry Anchor, minimum 1-1/4-inch into substrate, as manufactured by OMG Roofing Products

2.8.2 Tapcon 1/4-inch x minimum 1-1/4-inch in the substrate, as manufactured by Buildex.

2.8.3 Roofing Spike, minimum 1-1/4-inch into substrate, as manufactured by Powers Fasteners.

PART 3 - EXECUTION

3.1 General:

3.1.1 Furnish and install new wood blocking at all roof mounted equipment as required to provide a minimum flashing height of 8-inches above roof level.

3.1.2 Blocking shall be installed under integral equipment curbs as required to maintain full cant face above roof level and secured to the deck with appropriate fasteners through the deck as specified.

3.1.3 At small units (largest dimension up to 30-inches) where wood blocking can be installed beneath the units, new pressure-treated wood blocking may be installed on top of the existing curb. The wood blocking shall match the curb in width. New wood blocking shall be attached to the curb using specified wood screws and a minimum of 2 fasteners per side. Subsequent layers of wood blocking shall be secured using specified nails and a minimum of 2 nails per side.

3.1.4 At large units (smallest dimension over 30-inches) where wood blocking cannot be installed beneath the units, furnish and install new pre-manufactured galvanized steel curb extensions.

3.1.5 Extending and/or modifying ductwork, wiring, and/or plumbing as part of this work shall be included in the Base Bid. This work shall be accomplished by a mechanical, electrical, or plumbing contractor, as applicable, licensed to perform this work in the state of the South Carolina for no less than 5-years.

3.1.6 The cost for raising curbs or installing curb extensions shall be included in the Base Bid.

3.2 Wood Blocking Installation:

3.2.1 Furnish and install new wood blocking at all roof-mounted equipment as required to provide a minimum flashing height of 8 inches above roof level.

3.2.2 Parapets: Furnish and install new continuous wood blocking on top of the existing parapet as on shown on drawings. Secure the wood blocking to the existing using specified screws. Furnish and install wood fiber tapered edge strips at the top of the parapets. Edge strips shall provide a minimum slope of ¾-inch-per-foot across the parapet. Secure the wood fiber using two equally spaced rows of nails spaced no more than 12 inches on-center in each row. Offset the nail locations a minimum of 6 inches. Refer to Drawings.

3.2.3 Eave & Rake: Furnish and install new 6-inch wide wood blocking over the roof deck to match the height of the roof insulation adjacent to the eave. Secure the first layer of wood blocking using specified screws. Secure additional layers of new wood blocking using specified nails spaced no more than 12 inches on-center in each row. Refer to Drawings.

END OF SECTION

DIVISION 7

THERMAL AND MOISTURE PROTECTION

SECTION 07 22 16
ROOF BOARD INSULATION

PART 1 - GENERAL

1.1 Summary: Installation of new roof insulation, as specified herein.

1.2 Related Work:

1.2.1 Section 06 10 53 – Miscellaneous Rough Carpentry

1.2.2 Section 07 54 23 – Thermoplastic Polyolefin (TPO) Roofing

1.2.3 Section 07 54 19 – Polyvinyl Chloride (PVC) Roofing

1.2.4 Section 07 60 00 – Flashing and Sheet Metal

1.2.5 Section 22 14 00 – Roof Drains

1.3 Submittals: Refer to Section 01 33 00 of this Specification.

1.4 Environmental Conditions: Materials installation shall proceed only when weather conditions are in compliance with the applicable manufacturer's recommendations for installation and no precipitation is imminent. Materials installed during adverse weather conditions shall be subject to removal and replacement with new materials at no additional cost to Owner.

1.5 Warranty: Refer to Section 01 78 36 of this Specification.

PART 2 - PRODUCTS

2.1 Polyisocyanurate Roof Insulation: Flat and tapered, as specified, ASTM C1289, Type II, Class I. Board size shall not exceed 4’ x 8’ for mechanically attached insulation. Board size of tapered insulation shall not exceed 4’ x 4’. The Long-Term Thermal Resistance shall be a minimum of 5.7 per inch. Insulation compressive strength shall be minimum 20 psi. Insulation density shall be 2 pcf minimum. Thermal insulating factor as specified; however, thicknesses of each layer of insulation shall not exceed 2 inches.

2.2 Wood Fiber Tapered Edge Strips: ASTM C208, Type II, Grade 1 (Built-Up Roofs), C209. Approved for use by approved roofing system manufacturer.

2.3 Cover Board: Gypsum Fiber Board, Nominal 1/2” thick, ASTM C 1177, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E 84, nominal 900 psi minimum compressive strength, Class A, non-combustible, 4' x 8' board size.

2.4 Separator Board: Gypsum Fiber Board, nominal 1/4” thick, ASTM C 1177 or C1278, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E 84, nominal 900 psi minimum compressive strength, Class A, non-combustible, 4' x 8' board size. Approved for use by the roofing system manufacturer to adhere membrane flashings.

2.5 Fasteners & Plates:

2.5.1 Insulation Fastener: Minimum #12 steel screw roof insulation fastener for steel decking as approved by the roofing materials manufacturer requirements. Fasteners must pass a minimum of 15 cycles in the Kesternich SFW 2.0s DIN 50018 test with less than 15% red rust.

2.5.2 Insulation Fastener Plate: 3” ribbed, galvalume coated steel plate as approved by the roofing materials

manufacturer requirements.

2.5.3 Low-Rise Adhesive Fastener: double or single-component low-rise polyurethane adhesive as approved by the roofing system manufacturer.

PART 3 - EXECUTION

3.1 Coordination and Inspection

3.1.1 The substrate shall be clean, smooth, dry, and free of debris and all foreign matter prior to receiving insulation and cover board. Application of new materials shall constitute approval of the substrate by the Contractor.

3.1.2 The contractor bears the responsibility to locate any conduits that are in the decking flutes prior to the start of the work. The contractor shall to the full extent possible, not engage these conduits with screws, fasteners, etc. Should power be lost due to penetrate a conduit, the Contractor bears the responsibility to locate and repair the conduit and/or enclosed wiring to the original condition so as to restore power to the Owner. Cost associated with these repairs shall be borne by the Contractor at no additional cost to the Owner.

3.1.3 Repairs to conduit, writing, electrical equipment, and accessories under this paragraph shall be performed by an electrical contractor licensed to perform such work in the state of South Carolina with a minimum of 5 years experience in this type of work.

3.2 General Installation: Roof Insulation and Cover Board

3.2.1 Apply insulation with end joints staggered approximately one-half the length of the units.

3.2.2 Offset insulation joints from the preceding layer a minimum of six (6) inches.

3.2.3 Fit insulation units snugly to each other and to all vertical surfaces.

3.2.4 Low-Rise Foam Adhesive: Secure each board to the substrate using low-rise adhesive beads at spacings in accordance with the manufacturer's requirements to resist the uplift pressures and/or ratings shown on drawings for each zone and the approved tested assembly. Zone definition is indicated on drawings. Ensure insulation contact with adhesive by weighting units.

3.2.5 Mechanical Attachment: Secure each board to the metal deck using plates and fasteners in accordance with the manufacturer's requirements to resist the uplift pressures and/or ratings shown on drawings for each zone and the approved tested assembly. Zone definition is indicated on drawings. Partial units less than 4 square feet shall be secured with a minimum of 4 fasteners/plates. Provide insulation fastener of length to penetrate the roof deck a minimum of ¾ inch and a maximum of 1-1/2 inch.

3.2.6 Replace damaged units as required to provide a smooth surface and uniform insulation thickness.

3.3 General Requirements: Crickets/Saddles

3.3.1 Cricket/Saddles shall also meet the requirements of Paragraph 3.2 above.

3.3.2 Cricket/Saddles shall be constructed of factory tapered insulation double the slope of the roof.

3.3.2.1 Example: ¼-inch-per-foot tapered insulation shall be used on a 1/8-inch per foot roof slope.

3.3.3 Minimum cricket/saddle length to width ratio shall be 3:1 or comply with "NRCA L:W Ratios for Saddles and Crickets." Refer to figure 4-13 of the NRCA Roofing Manual, Membrane Roof Systems.

3.3.3.1 Example: A 12-foot long cricket shall be a minimum of 4-feet wide.

3.3.3.2 Contractor may adjust cricket/saddle length to width ratio to prevent ponding at roof curbs or other penetrations based on field conditions. Contractor is responsible for preventing ponding.

3.3.4 Start cricket construction by striking chalk lines for outer edges of tapered units. Install the first row along the chalk lines, mitering and fitting at the points where lines break.

3.3.5 Complete the cricket assembly using tapered isocyanurate and isocyanurate fill units. Fill unit shall not exceed 2 inches in thickness.

3.3.6 The thin edge of the tapered insulation shall be ½" and shall be located at the valley created by the tapered insulation and the roof insulation.

3.3.7 Remove and replace damaged units with new insulation or repair to provide a smooth surface and uniform insulation thickness.

3.3.8 Utilize tapered wood fiber edge strips that transition from 0" to 1/2" as the first layer of tapered insulation to provide a smooth transition. Set wood fiber on top of the insulation in one continuous band of low-rise foam adhesive.

3.4 Installation – Roof Area A1, A2, A3, A4, A5, A6, A7, A8, A9, and A10 (Flat Metal Deck):

3.4.1 Apply one layer of 1-1/2-inch-thick isocyanurate insulation to the roof deck and secure by mechanical attachment.

3.4.2 Apply one layer of 2-inch-thick isocyanurate insulation to the first layer of insulation and secure using low-rise adhesive.

3.4.3 Apply one layer of 1/8-inch-per foot tapered insulation and fill units and secure using low-rise foam adhesive.

3.4.4 Furnish and install tapered insulation to move water from walls, form valleys/crickets, as shown on roof plans, using factory-tapered isocyanurate units and isocyanurate fill units.

3.4.4.1 Areas A1, A2, A3, A4, A5, A6, A9, and A10 - At the primary drain sumps shown on the plans, apply 1/2 inch per foot tapered isocyanurate, and isocyanurate fill units that extends from the drain bowl/scupper opening to a width that matches the size of the sump (4-foot square, unless otherwise noted). Prior to installing the tapered insulation, furnish and install drain sumps with new flat isocyanurate insulation that ends approximately 3/4 inch below the drain bowl. Secure each flat board to the substrate in accordance with Paragraphs 3.5.1 of this Section of the specification. The thin edge of the tapered insulation shall be located adjacent to the drain. Increase the thickness of the tapered insulation until it matches the thickness of the new isocyanurate insulation. Remove and replace damaged units with new insulation or repair to provide a smooth surface and uniform insulation thickness. Apply the tapered insulation to the flat insulation secure by mechanical attachment.

i Roof system thickness at drains shall be 3-1/4-inches.

ii Field fabricated sumps shall be rejected.

3.4.5 Furnish and install one layer of nominal 1/2-inch-thick cover board over all isocyanurate insulation and secure using low-rise foam adhesive.

3.5 Installation – Roof Areas B1, B2, and B3 (Sloped Metal Deck):

3.5.1 Apply one layer of minimum 2-inch-thick isocyanurate insulation to the roof deck and secure by mechanical attachment.

3.5.2 Apply one layer of 2-inch-thick isocyanurate insulation to the first layer of insulation and secure using low-rise adhesive.

3.5.3 Furnish and install tapered insulation to move water from walls, form valleys/crickets, as shown on roof plans, using factory-tapered isocyanurate units and isocyanurate fill units. Secure using low-rise adhesive.

3.5.4 At the primary scupper sumps shown on the plans, apply 1/2 inch per foot tapered isocyanurate, and isocyanurate fill units that extends from the drain bowl/scupper opening to a width that matches the size of the sump (4-foot square, unless otherwise noted). Increase the thickness of the tapered insulation until it matches the thickness of the new isocyanurate insulation. Remove and replace damaged units with new insulation or repair to provide a smooth surface and uniform insulation thickness. Apply the tapered insulation to the flat insulation secure using low-rise adhesive.

3.5.4.1 Roof system thickness at drains shall be 3-1/4-inches.

3.5.4.2 Field fabricated sumps shall be rejected.

3.5.5 Furnish and install one layer of nominal ½-inch-thick cover board over all isocyanurate insulation and secure using low-rise foam adhesive.

3.6 Installation – Roof Area C1, C2 (Flat Concrete Deck)

3.6.1 Apply one layer of minimum 1-1/2-inch-thick isocyanurate insulation to the roof deck and secure using low-rise adhesive.

3.6.2 Apply one layer of 2-inch-thick isocyanurate insulation to the first layer of insulation and secure using low-rise adhesive.

3.6.3 Apply one layer of 1/8-inch-per foot tapered insulation and fill units and secure using low-rise foam adhesive.

3.6.4 Furnish and install tapered insulation to move water from walls, form valleys/crickets, as shown on roof plans, using factory-tapered isocyanurate units and isocyanurate fill units. Secure using low-rise adhesive.

3.6.5 At the primary drain sumps shown on the plans, apply 1/2 inch per foot tapered isocyanurate, and isocyanurate fill units that extends from the drain bowl/scupper opening to a width that matches the size of the sump (4-foot square, unless otherwise noted). Prior to installing the tapered insulation, furnish and install new flat isocyanurate insulation that ends approximately ¼ inch below the drain bowl. Secure each flat board to the substrate in accordance with Paragraphs 3.6.1 of this Section of the specification. The thin edge of the tapered insulation shall be located adjacent to the drain bowl. Fill units shall not exceed 2 inch in thickness. The insulation thickness adjacent to the drain shall be nominal 1/2 inch. Increase the thickness of the tapered insulation until it matches the thickness of the new isocyanurate insulation. Remove and replace damaged units with new insulation or repair to provide a smooth surface and uniform insulation thickness. Apply the tapered insulation to the flat insulation secure using low-rise adhesive.

3.6.5.1 Roof system thickness at drains shall be 3-1/4-inches.

3.6.5.2 Field fabricated sumps shall be rejected.

3.6.6 Furnish and install one layer of nominal ½-inch-thick cover board over all isocyanurate insulation and secure using low-rise foam adhesive.

3.7 Separator Board: At curbs and walls above roof level where bituminous flashings have been removed and new plywood or metal is not installed, furnish and install a new separator board over the substrate where new membrane flashings will be applied. Secure the board to the substrate using specified fasteners and insulation plates at spacings not to exceed 18 inches on-center, in every direction and a minimum of 2 rows of fasteners. Fasteners shall penetrate the substrate a minimum of 1 inch.

END OF SECTION

SECTION 07 54 19
POLYVINYL CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 Work Included: Installation of a polyvinyl chloride (PVC) roof membrane, as specified herein.

1.2 Related Work

1.2.1 Selective Demolition and Preparations – 02 41 13

1.2.2 Roof Board Insulation - Section 07 22 16

1.2.3 Flashing and Sheet Metal – Section 07 60 00

1.3 Submittals: In accordance with Section 01 33 00 of this Specification

1.3.1 Contractor shall submit to designer for approval membrane roofing system that is identical to systems that have been successfully tested by a qualified testing agency or has been engineered by the manufacturer to resist uplift pressure calculated according to ASCE/SEI 7 and meets ASTM E 108 or UL 790 Class A fire rating. Wind up lift requirements can be found on drawings.

1.4 Environmental Conditions: Material installation shall proceed only when weather conditions are in compliance with the applicable manufacturer's recommendations for installation and no precipitation is imminent. Materials installed during adverse weather conditions shall be subject to removal and replacement with new materials at no additional cost to Owner.

1.5 Preconstruction Testing

1.5.1 The contractor shall retain the services of a licensed third-party testing firm to perform mechanical fastener pull out tests prior to installing membrane. The contractor shall repair openings in the roof to a watertight condition. Perform test at each type of roof deck requiring mechanical fasteners. Perform test in accordance with ANSI/SPR FX-1. Test results and photographs shall be composed into a report that shall be issued to the Owner and Designer within 48 hours of the test. Submit manufacturer's tested assembly to comply with results of the pull test.

1.6 Quality Assurance

1.6.1 Contractor shall perform a minimum 8-hour water test at 15% of the primary drains as described after membrane and flashing installation at drains. Drains for testing to be selected by the Design Professional.

1.6.2 Water test shall only be performed after sun set and when no inclement weather is expected over the next 24 hours.

1.6.3 Document existing conditions with time/date stamped photographs beneath drains, including stained ceiling tiles, piping, and decking.

1.6.4 Plug each drain using an elastomeric plug to prevent any water seepage.

1.6.5 Fill the sump/drain area with water until a 2-inch head is accomplished directly over the center of the drain bowl. Cover the area with plastic and seal to prevent water evaporation.

1.6.6 After a lapse of 8 hours, check the water head at the center of the drain bowl.

1.6.7 Document conditions beneath and at drain bowls with time/date stamped photographs, including ceiling

tiles, piping, and decking, relative to the existing conditions noted above.

1.6.8 Prepare report of finding for Designer and Owner review

1.7 Warranty: In accordance with Section 01 78 36 of this Specification.

1.8 Wind Uplift Resistance: Refer to Drawings.

1.9 Fire Resistance: Class A.

PART 2 - PRODUCTS

2.1 Acceptable Roofing System Manufacturers:

2.1.1 Carlisle Syntec
2.1.2 Versico
2.1.3 Firestone
2.1.4 Sika Sarnafil
2.1.5 GAF
2.1.6 Soprema
2.1.7 Approved alternate prior to bid.

2.2 Polyvinyl Chloride Roofing Materials

2.2.1. Polyvinyl Chloride Roofing Membrane: ASTM 4434, Nominal 60-mil overall thickness with minimum 23 mil thickness above the scrim. A minimum puncture resistance of 320 pounds as tested in accordance with FTM 101C, Method 2031.

2.2.1.1. Maximum sheet width of 12-feet for fully adhered membrane.

2.2.1.2. Membrane color: White.

2.2.1 **(Additive Alternate No. 1)** Polyvinyl Chloride Roofing Membrane: ASTM 4434, Nominal 80-mil overall thickness with minimum 33 mil thickness above the scrim. A minimum puncture resistance of 380 pounds as tested in accordance with FTM 101C, Method 2031.

2.2.1.3. Maximum sheet width of 12-feet for fully adhered membrane.

2.2.1.4. Membrane color: White.

2.2.2 Membrane Adhesive (Solvent-Based), as manufactured by the approved roofing system manufacturer.

2.2.3 General Purpose Sealant (to match membrane color). As manufactured by the approved roofing system manufacturer.

2.2.4 T-Joint Covers. As manufactured by the approved roofing system manufacturer.

2.2.5 Inside/Outside Molded Corners. As manufactured by the roofing system manufacturer. The use of field-fabricated inside/outside corners is not acceptable.

2.2.6 Large and Small Pipe Flashing. As manufactured by the roofing system manufacturer.

2.2.7 Universal Pipe Boot. As manufactured by the roofing system manufacturer. Pre-fabricated flashing boot shall include a draw band for securing the top of the flashing boot to the pipe.

2.2.8 Unsupported Membrane. As manufactured by the approved roofing system manufacturer. Minimum 55 mil thickness.

2.2.9 Cut Edge Sealant. As manufactured by the approved roofing system manufacturer.

2.2.10 Membrane Cleaner: As manufactured by the approved roofing system manufacturer. For use in removing foreign debris from the membrane prior to welding.

2.2.11 Membrane-Clad Metal: As manufactured by the approved roofing system manufacturer, ASTM A653, minimum 24 ga. galvanized steel clad with membrane.

2.2.12 Termination Bar. As manufactured or approved by the approved roofing system manufacturer.

2.2.13 Polyurethane Caulk: As manufactured and/or approved by the roofing system manufacturer. To be applied at those locations identified by the manufacturer.

2.2.14 Water Cut-Off Mastic: As manufactured and/or approved by the roofing system manufacturer. To be applied at those locations identified by the manufacturer.

2.3 Membrane Welding Machines: As approved by the roofing system manufacturer. Contractor shall provide written documentation that operators have received the roofing system manufacturer's required training to operate equipment. Welders shall be maintained in good working order and shall be operated and maintained in accordance with the welding machine manufacturer's written instructions.

2.4 Walkway Pads: As manufactured by the approved roofing system manufacturer. Nominal 30" wide.

2.5 Foam Core: Compression tube that is a minimum of 1.5 times larger than the expansion joint opening, as approved for use by the approved roofing system manufacturer.

2.6 Roofing Nails: With minimum 1" head, such as Simplex nails or approved equal.

2.7 Fasteners

2.7.1 Membrane Fastener: Minimum #15 steel screw roof fastener for steel decking as approved by the approved roofing materials manufacturer to resist uplift requirements shown on plans. Minimum pull-out in new Grade C, 22-gauge decking is 640 lbs. Fasteners must pass a minimum of 15 cycles in the Kesternich SFW 2.0s DIN 50018 test with less than 15% red rust. Provide fasteners of lengths to penetrate the top of the roof deck a minimum of 1-inch and no more than 1-1/2-inch.

2.7.2 Seam Plate: Minimum 2-3/8" grooved, galvalume steel plate. As approved by the roofing materials manufacturer to use in conjunction with the specified membrane fasteners to attach thermoplastic membrane.

2.8 Masonry Anchor:

2.8.1 Masonry Anchor, minimum 1-1/4 inch into substrate, as manufactured by OMG Roofing Products
2.8.2 Tapcon ¼" x minimum 1-1/4" in the substrate, as manufactured by Buildex.
2.8.3 Roofing Spike, minimum 1-1/4 inch into substrate, as manufactured by Powers Fasteners.
2.8.4 Approved equal prior to bid.

PART 3 - EXECUTION

3.1 Inspection

3.1.1 The substrate shall be clean, smooth, dry, free of debris and all foreign matter prior to installation of the

roof membrane. Application of new materials shall constitute approval of the substrate by the Roofing Contractor.

3.1.2 Insulation joints with gaps greater than ¼" shall be filled with roof insulation in order to provide a smooth surface.

3.2 Fully Adhered Roof Membrane Installation

3.2.1 Unroll the membrane sheets and allow them to relax in accordance with the roofing system manufacturer's recommendations and ambient temperature at the time of this phase of the work.

3.2.2 Remove any damaged or creased membrane sections, and discard.

3.2.3 All membrane surfaces to be welded shall be clean and dry. No adhesive shall be present within the lap areas.

3.2.4 Solvent-Based Adhesive

3.2.4.1 Fold the sheet back evenly without wrinkles onto itself to expose the underside. Position the sheet at any field splices by overlapping the membrane approximately 5 inches, unless the manufacturer has a more stringent requirement. Once the membrane is in place, mark the bottom sheet ½" - ¾" from the edge of the top sheet every 4' - 6' with a lumber crayon or similar type marking device.

3.2.4.2 Sweep the substrate with a stiff broom to remove materials that will interfere with the proper installation of the membrane.

3.2.4.3 Apply the manufacturer's bonding adhesive to both the exposed underside of the sheet and the substrate to which it will be adhered to allow approximately the same drying time. Apply adhesive to provide an even and uniform film thickness. Care shall be taken not to apply adhesive over an area that is to be later cleaned and spliced to another sheet of flashing.

3.2.4.4 Allow adhesive to flash off until tacky. Touch the adhesive surface with a clean dry finger to be certain that the adhesive does not stick or string. Also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness.

3.2.4.5 Starting at the fold, roll the previously coated portion of the sheet into the coated substrate slowly and evenly to minimize wrinkles. Compress the bonded half of the sheet to the substrate with a stiff push broom.

3.2.4.6 Fold the unadhered half of the membrane sheet back onto itself and repeat the bonding procedure to complete the bonding of the sheet.

3.2.5 At eaves, the membrane shall be mechanically fastened to the eave wood blocking using membrane fasteners and plates spaced no more than 12 inches on-center. Extend an additional membrane over the wood blocking a distance to match the depth of the gutter at gutter eaves or the rake flashing at rake eaves. Extend the additional membrane a minimum of 5 inches onto the roofing past the eave membrane fasteners. Fully adhere the membrane to the wood blocking and fasten to the vertical face of the wood blocking using roofing nails spaced no more than 12 inches on-center. Fully weld the membrane to the roofing. Set the edge of the membrane in continuous multi-purpose tape.

3.2.6 Vertical Surfaces:

3.2.6.1 At vertical surfaces, turn the membrane up the vertical surface a minimum of 2 inches and fully adhere using the manufacturer's approved adhesive. Secure the membrane to the substrate using

the roofing system manufacturer's approved termination bar or fasteners/plates, and secure in accordance with their written instructions. Fasteners shall penetrate the substrate at spacings and depths approved by the roofing system manufacturer.

3.2.6.2 At the base of curbs, parapets, and other vertical surfaces, the membrane shall be mechanically fastened to the metal decking using membrane fasteners and plates spaced no more than 12 inches on-center.

3.2.7 Primary & Overflow Roof Drains: Where membrane laps are within 18-inches of the drain bowl, furnish and install a minimum 36" x 36" target patch centered over the roof drain. Apply target patch above the field membrane. Cut an opening in the target patch at the center of the drain bowl so that the membrane extends past the interior edge of the drain bowl a minimum of 1 inch. Fully weld target patch and field membrane splices a minimum of 2 inches on all sides. Weld in accordance with this section of the specification. Apply water block between the target patch and the drain bowl prior to applying the drain clamping ring.

3.2.7.1 Ensure adhesion to painted substrate which has been prepared according to specification section 22 14 00, paragraph 3.1.

3.2.7.2 Ensure drain extensions and manufacturer drain sumps have been applied.

i Field fabricated drain sumps shall be ground for rejection.

ii Drain sumps shall not be applied at overflow locations.

3.2.8 Furnish and install the roofing system manufacturer's patches at all required locations such as intersecting field seams. Apply the manufacturer's approved seam caulk, as required, at locations specified by the roofing system manufacturer.

3.2.9 Prior to final inspection, the surface of the membrane shall be cleaned of all debris, dust, and foreign material. This may require the use of water, detergents, and other cleaning agents approved by the roofing system manufacturer. Contractor will be responsible for providing the necessary items to perform this task. Do not use any abrasive pads that can score the polymer.

3.3 Base Flashings Installation

3.3.1 Roll out the membrane to be used for base flashings and allow to relax in accordance with the roofing system manufacturer's written instructions.

3.3.2 Flashing pieces shall extend onto the roof a minimum 3 inches past the roof membrane fasteners at the edge of the sheet and up the vertical surface a minimum of 8 inches.

3.3.3 Fully adhere the flashing to the substrate using the roofing system manufacturer's approved flashing adhesive.

3.3.4 Base flashing shall be smooth to the substrate, and wrinkles in base flashing shall be grounds for rejection.

3.3.5 If base flashings terminate at a corner and edges would be exposed, furnish and install new 4-inch x 4-inch L-type membrane-clad metal closures with an exterior edge caulking cove. If base flashings terminate at walls and edges would be exposed, furnish and install new 4-inch-wide L-type membrane-clad metal closures with an exterior edge caulking cove. The closure shall be set in water cut-off mastic or butyl tape, and fastened to the substrate using appropriate fasteners at spacings not to exceed 12 inches on center. Completely hot air weld the base flashings to the membrane-clad metal. Apply a non-shrinking sealant, such as NP-1 or approved equal, to the caulking cove at the exterior edge of the

closure. Completely remove all residual asphalt from the substrate prior to installing any sealant or caulking.

3.3.6 At inside and outside corners of curbs and parapets, Contractor shall use the roofing system manufacturer's pre-fabricated corner pieces. The use of field-fabricated pieces is not acceptable. Pre-fabricated pieces shall be installed in accordance with the roofing system manufacturer's written instructions.

3.3.7 At locations where base flashing seam transition from vertical to horizontal, the contractor shall furnish and install new unsupported patches at these locations shall extend a minimum of 3 inches past the transition, centered over the seams in all directions.

3.3.8 Use the roofing system manufacturer's termination bar at base flashing that exceed 36 inches in height. Install rows of termination equally spaced up the wall. Fastener spacings not to exceed 8 inches on center. Set flashing in water cut-off mastic, set the bar over the edge of the base flashing, and apply caulk at the top of the flashing.

3.3.9 At a minimum, extend base flashings up and over the top horizontal surface of curbs and inside the curb a minimum of 1 inch, unless otherwise stated in specification or shown on drawings.

3.3.10 Extend the base flashing over the top of the parapet and down the outside face of the wood blocking. Base flashing shall extend down past the outside face of the parapet wood blocking a minimum of 1 inch. Fully adhere the membrane to the wood blocking and fasten to the vertical face of the wood blocking using roofing nails at spacings not to exceed 12 inches on-center. Set the edge of the membrane in continuous multi-purpose tape.

3.4 Expansion Joints: Install new membrane expansion joints as indicated on drawings. Secure the field membrane at the base of curbs as specified herein. Form a membrane envelope that matches the depth of the curb and roof insulation. Fill envelope with batt insulation. Furnish and install continuous foam core over the opening. Cover the joint and foam core with the base flashings and/or additional membrane as indicated on drawings. Reinforce the seams over the expansion joint with additional membrane that shall extend a minimum of 3 inches past the expansion joint seams in every direction.

3.5 Heat Welding

3.5.1 Hot air weld all sheet seams using either a machine or hand-held hot air welder approved by the roofing system manufacturer. A copy of the operating instructions shall be provided to the Designer prior to the start of the project.

3.5.2 Monitor the temperature of the hot air welder so as to minimize the amount of smoke that should develop and to ensure that the material from the bottom of the sheet begins to soften and flow from the seam. Hand held welders shall insure that membrane welding is immediately followed by a hand roller to press the heated membrane surfaces together with slow, even movements.

3.5.3 All seams shall be manually probed using a blunt rounded instrument daily. Any fishmouths or other seam defects where the seam is not fully adhered shall be repaired in accordance with the roofing system manufacturer's instructions.

3.5.4 After seams have set for approximately 8 hours, the Contractor shall make a minimum of 3, 2" x 12" test cuts across the seam, with at least one of the test cuts taken from the first seam of the day. If multiple welders are used, the minimum test cuts are applicable to each welder used. Test cuts shall be repaired by the Contractor daily and shall be done at no additional cost to the Owner. In lieu of test cuts, the contractor may perform peel tests. Peel test shall be performed with two 4" x 12" pieces of membrane that shall be welded together 1-1/2 inch for the machine welder and 2 inches for hand welders. The membrane shall be pulled apart across the seam. Test shall be dated, and one test shall be performed

every time a welding device is turned on. An archive of test shall be available for Designer inspection.

Peel-test shall only be considered successful if:

i there is a complete cohesion failure in a polymer layer, and/or

ii there is an adhesion failure between a polymer layer and the scrim.

iii Other instances as stated in writing by the membrane manufacturer.

3.5.5 Seams shall be tested in accordance with the roofing system manufacturer's instructions and evaluated for seam integrity. Seams that fail this test shall be subject to additional test cuts, as directed by the Designer and/or roofing system manufacturer, in order to further quantify the extend of the deficient condition. Repairs to deficient seams and/or test cut locations shall be performed by the Contractor at no additional cost to the Owner.

3.5.6 Seal the edges of the membrane where the reinforcing fabric is cut with the roofing system manufacturer's approved seam sealant. Such work shall be done on a daily basis.

3.6 Pipe Flashing Installation

3.6.1 Pipe penetrations shall be flashed using pre-manufactured pipe flashings. Cut the pipe flashing so that it will fit tight to the pipe penetration. Ensure that the field membrane is secured at the base of the pipe as required herein. Fully weld the pipe flashing flange to the field membrane in accordance with membrane manufacturer written instruction. Set the pipe flashing in water block against the pipe penetration, and secure the top of the pipe flashing to the pipe using a draw-band clamp. Seal the top of the pipe flashing to the pipe penetration using NP-1 sealant, or approved equal.

3.6.2 At locations where pre-manufactured pipe flashing cannot be installed, the contractor may field flash the pipe penetration. Field flashing shall extend onto the roofing membrane a minimum of 2 inches past the membrane fasteners. Field flashing shall extend up of the pipe penetration a minimum of 6 inches. The top of the field flashing shall receive water block, draw-band clamp, and sealant in accordance with Paragraph 3.5.1 above. At square penetrations, secure the top edge of the field flashing using a self-adhering membrane stripping membrane. Prime the penetration and membrane prior to applying the self-adhering membrane.

3.6.3 Install any necessary pre-molded pitch pans in accordance with manufacturer written instructions. Prior to applying pourable sealer, seal the penetration though the membrane with sealant.

3.7 Walkway Pad

3.7.1 Apply one row of walkway pads around all roof access hatches, at the base of roof access doors, at the top and bottom of ship ladders, and as shown on drawings. Install walkway pads in accordance with the roofing system manufacturer's written instructions. Refer to Drawings.

3.7.2 Walkway pads shall be spaced approximately 1 inch apart. Leave small opening on the downslope side of walkway pads to allow for any water beneath the pads to exit.

3.7.3 Clean the surface of the membrane to receive the walkway pads in accordance with the roofing system manufacturer's written instructions. Fully adhere the walkway pad to the membrane and hot-air weld all sides of the pads to the surface of the membrane in accordance with the roofing system manufacturer's written instructions.

3.8 Field Quality Requirements:

3.8.1 Manufacturer's Field Services: Upon Owner's request, provide material manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.8.2 Minimum Manufacturer Inspections: Provide inspections by a Technical Representative employed by the roofing system manufacturer whom shall not perform any sales functions. Contractor shall complete any necessary repairs required for issuance of warranty. Minimum schedule of material manufacturer inspections:

3.8.2.1 Pre-Construction Conference
3.8.2.2 Mock-Up Evaluation
3.8.2.3 25% Completion
3.8.2.4 50% Completion
3.8.2.5 Final Completion

3.8.3 Contractor shall provide Owner and Designer a copy of the manufacturer’s inspection report within 48-hours of each inspection.

3.9 Prior to final inspection, the surface of the membranes shall be cleaned of all debris, dust, and foreign material. This may require the use of water, detergents, and other cleaning agents approved by the roofing system manufacturer. Contractor will be responsible for providing the necessary items to perform this task. Do not use any abrasive pads that can score the polymer.

END OF SECTION

SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 Work Included: Installation of a thermoplastic polyolefin (TPO) roof membrane, as specified herein.

1.2 Related Work

1.2.1 Section 02 41 13 - Selective Demolition and Preparations

1.2.2 Section 07 22 16 - Roof Board Insulation

1.2.3 Section 07 60 00 - Flashing and Sheet Metal

1.3 Submittals: In accordance with Section 01 33 00 of this Specification

1.3.1 Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing agency or has been engineered by the manufacturer to resist uplift pressure calculated according to ASCE/SEI 7 and meets ASTM E 108 or UL 790 Class A fire rating. Wind up lift requirements can be found on drawings.

1.4 Environmental Conditions: Material installation shall proceed only when weather conditions are in compliance with the applicable manufacturer's recommendations for installation and no precipitation is imminent. Materials installed during adverse weather conditions shall be subject to removal and replacement with new materials at no additional cost to Owner.

1.5 Preconstruction Testing

1.5.1 The contractor shall retain the services of a licensed third-party testing firm to perform mechanical fastener pull out tests prior to installing membrane. The contractor shall repair openings in the roof to a watertight condition. Perform test at each type of roof deck requiring mechanical fasteners. Perform test in accordance with ANSI/SPRI FX-1. Test results and photographs shall be composed into a report that shall be issued to the Owner and Designer within 48 hours of the test. Submit manufacturer's tested assembly to comply with results of the pull test.

1.6 Quality Assurance

1.6.1 Contractor shall perform a minimum 8-hour water test at 15% of the primary drains as described after membrane and flashing installation at drains. Drains for testing to be selected by the Design Professional.
1.6.2 Water test shall only be performed after sun set and when no inclement weather is expected over the next 24 hours.
1.6.3 Document existing conditions with time/date stamped photographs beneath drains, including stained ceiling tiles, piping, and decking.
1.6.4 Plug each drain using an elastomeric plug to prevent any water seepage.
1.6.5 Fill the sump/drain area with water until a 2-inch head is accomplished directly over the center of the drain bowl. Cover the area with plastic and seal to prevent water evaporation.
1.6.6 After a lapse of 8 hours, check the water head at the center of the drain bowl.
1.6.7 Document conditions beneath and at drain bowls with time/date stamped photographs, including ceiling tiles, piping, and decking, relative to the existing conditions noted above.
1.6.8 Prepare report of finding for Designer and Owner review

1.7 Warranty: In accordance with Section 01 78 36 of this Specification.

1.8 Wind Uplift Resistance: Refer to Drawings.

1.9 Fire Resistance: Class A.

PART 2 - PRODUCTS

2.1 Acceptable Roofing System Manufacturers:

2.1.1 Carlisle Syntec: Sure-Weld
2.1.2 Firestone: UltraPly TPO
2.1.3 GAF: EverGuard TPO
2.1.4 Approved alternate prior to bid.

2.2 Thermoplastic Polyolefin Roofing Materials

2.2.1 Thermoplastic Polyolefin Membrane. ASTM D6878, Nominal 60 mil overall thickness with minimum 21 mil polymer thickness above the scrim. A minimum tearing strength of 120 pounds as tested in accordance with ASTM D751. A minimum puncture resistance of 300 pounds as tested in accordance with FTM 101C, Method 2031.

2.2.1.1 Membrane color: White

2.2.2 **(Additive Alternate No. 1)** Thermoplastic Polyolefin Membrane. ASTM D6878, Nominal 80 mil overall thickness with minimum 30 mil polymer thickness above the scrim. A minimum tearing strength of 120 pounds as tested in accordance with ASTM D751. A minimum puncture resistance of 400 pounds as tested in accordance with FTM 101C, Method 2031.

2.2.2.1 Membrane color: White

2.2.3 Membrane Adhesive (Solvent-Based), as manufactured by the approved roofing system manufacturer.

2.2.4 General Purpose Sealant (White). As manufactured by the approved roofing system manufacturer.

2.2.5 T-Joint Covers. As manufactured by the approved roofing system manufacturer.

2.2.6 Inside/Outside Molded Corners. As manufactured by the roofing system manufacturer. The use of field-fabricated inside/outside corners is not acceptable.

2.2.7 Large and Small Pipe Flashing. As manufactured by the roofing system manufacturer.

2.2.8 Universal Pipe Boot. As manufactured by the roofing system manufacturer. Pre-fabricated flashing boot shall include a draw band for securing the top of the flashing boot to the pipe.

2.2.9 Unsupported Membrane. As manufactured by the approved roofing system manufacturer. Minimum 55 mil thickness.

2.2.10 Cut Edge Sealant. As manufactured by the approved roofing system manufacturer.

2.2.11 Membrane Cleaner: As manufactured by the approved roofing system manufacturer. For use in removing foreign debris from the membrane prior to welding.

2.2.12 Membrane-Clad Metal: As manufactured by the approved roofing system manufacturer, ASTM A653, minimum 24 ga. galvanized steel clad with membrane.

2.2.12.1 Scuppers and Scupper Exterior Flange: Minimum 0.040-inch-thick aluminum clad with membrane.

2.2.13 Termination Bar. As manufactured or approved by the approved roofing system manufacturer.

2.2.14 Polyurethane Caulk: As manufactured and/or approved by the roofing system manufacturer. To be applied at those locations identified by the manufacturer.

2.2.15 Water Cut-Off Mastic: As manufactured and/or approved by the roofing system manufacturer. To be applied at those locations identified by the manufacturer.

2.3 Membrane Welding Machines: As approved by the roofing system manufacturer. Contractor shall provide written documentation that operators have received the roofing system manufacturer's required training to operate equipment. Welders shall be maintained in good working order and shall be operated and maintained in accordance with the welding machine manufacturer's written instructions.

2.4 Walkway Pads: As manufactured by the approved roofing system manufacturer. Nominal 30" wide.

2.5 Foam Core: Compression tube that is a minimum of 1.5 times larger than the expansion joint opening, as approved for use by the approved roofing system manufacturer.

2.6 Roofing Nails: With minimum 1" head, such as Simplex nails or approved equal.

2.7 Fasteners

2.7.1 Membrane Fastener: Minimum #15 steel screw roof fastener for steel decking as approved by the approved roofing materials manufacturer to resist uplift requirements shown on plans. Minimum pull-out in new Grade C, 22 gauge decking is 640 lbs. Fasteners must pass a minimum of 15 cycles in the Kesternich SFW 2.0s DIN 50018 test with less than 15% red rust. Provide fasteners of lengths to penetrate the top of the roof deck a minimum of 1-inch and no more than 1-1/2-inch.

2.7.2 Seam Plate: Minimum 2-3/8" grooved, galvalume steel plate. As approved by the roofing materials manufacturer to use in conjunction with the specified membrane fasteners to attach thermoplastic membrane.

2.8 Masonry Anchor:

2.8.1 Masonry Anchor, minimum 1-1/4 inch into substrate, as manufactured by OMG Roofing Products

2.8.2 Tapcon ¼" x minimum 1-1/4" in the substrate, as manufactured by Buildex.

2.8.3 Roofing Spike, minimum 1-1/4 inch into substrate, as manufactured by Powers Fasteners.

2.8.4 Approved equal prior to bid.

PART 3 - EXECUTION

3.1 Inspection

3.1.1 The substrate shall be clean, smooth, dry, free of debris and all foreign matter prior to installation of the roof membrane. Application of new materials shall constitute approval of the substrate by the Roofing Contractor.

3.1.2 Insulation joints with gaps greater than ¼" shall be filled with roof insulation in order to provide a smooth surface.

3.1.3 Prior to installation, confirm deck orientation. TPO membrane sheets shall be installed perpendicular to the deck flutes.

3.2 Fully Adhered Roof Membrane Installation.

3.2.1 Unroll the membrane sheets and allow them to relax in accordance with the roofing system manufacturer's recommendations and ambient temperature at the time of this phase of the work.

3.2.2 Remove any damaged or creased membrane sections, and discard.

3.2.3 All membrane surfaces to be welded shall be clean and dry. No adhesive shall be present within the lap areas.

3.2.4 Solvent-Based Adhesive

3.2.5 Fold the sheet back evenly without wrinkles onto itself to expose the underside. Position the sheet at any field splices by overlapping the membrane approximately 5 inches, unless the manufacturer has a more stringent requirement. Once the membrane is in place, mark the bottom sheet ½" - ¾" from the edge of the top sheet every 4' - 6' with a lumber crayon or similar type marking device.

3.2.6 Sweep the substrate with a stiff broom to remove materials that will interfere with the proper installation of the membrane.

3.2.7 Apply the manufacturer's bonding adhesive to both the exposed underside of the sheet and the substrate to which it will be adhered to allow approximately the same drying time. Apply adhesive to provide an even and uniform film thickness. Care shall be taken not to apply adhesive over an area that is to be later cleaned and spliced to another sheet of flashing.

3.2.8 Allow adhesive to flash off until tacky. Touch the adhesive surface with a clean dry finger to be certain that the adhesive does not stick or string. Also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness.

3.2.9 Starting at the fold, roll the previously coated portion of the sheet into the coated substrate slowly and evenly to minimize wrinkles. Compress the bonded half of the sheet to the substrate with a stiff push broom.

3.2.10 Fold the unadhered half of the membrane sheet back onto itself and repeat the bonding procedure to complete the bonding of the sheet.

3.2.11 At eaves, extend the membrane down the vertical face a minimum of 1" past the exterior finish. Fully adhere the membrane to the wood blocking and fasten to the vertical face of the wood blocking using roofing nails spaced no more than 12 inches on-center. Set the edge of the membrane in continuous sealant or multi-purpose tape.

3.2.12 At eaves, the membrane shall be mechanically fastened to the eave wood blocking using membrane fasteners and plates spaced no more than 12 inches on-center. Extend an additional membrane over the wood blocking a distance to match the depth of the gutter at gutter eaves or the rake flashing at rake eaves. Extend the additional membrane a minimum of 5 inches onto the roofing past the eave membrane fasteners. Fully adhere the membrane to the wood blocking and fasten to the vertical face of the wood blocking using roofing nails spaced no more than 12 inches on-center. Fully weld the membrane to the roofing. Set the edge of the membrane in continuous multi-purpose tape.

3.2.13 Vertical Surfaces:

3.2.13.1 At vertical surfaces, turn the membrane up the vertical surface a minimum of 2 inches and fully adhere using the manufacturer's approved adhesive. Secure the membrane to the substrate using the roofing system manufacturer's approved termination bar or fasteners/plates, and secure in accordance with their written instructions. Fasteners shall penetrate the substrate at spacings and

depths approved by the roofing system manufacturer.

3.2.13.2 At the base of curbs, parapets, and other vertical surfaces, the membrane shall be mechanically fastened to the metal decking using membrane fasteners and plates spaced no more than 12 inches on-center.

3.2.14 Primary & Overflow Roof Drains: Where membrane laps are within 18-inches of the drain bowl, furnish and install a minimum 36” x 36” target patch centered over the roof drain. Apply target patch above the field membrane. Cut an opening in the target patch at the center of the drain bowl so that the membrane extends past the interior edge of the drain bowl a minimum of 1 inch. Fully weld target patch and field membrane splices a minimum of 2 inches on all sides. Weld in accordance with this section of the specification. Apply water block between the target patch and the drain bowl prior to applying the drain clamping ring.

3.2.14.1 Note: Contractor shall install drain assemblies to be watertight at the end of each work day.

a) Field fabricated drain sumps shall be ground for rejection.

b) Drain sumps shall not be applied at overflow locations.

3.2.15 Furnish and install the roofing system manufacturer’s patches at all required locations such as intersecting field seams. Apply the manufacturer’s approved seam caulk, as required, at locations specified by the roofing system manufacturer.

3.2.16 Prior to final inspection, the surface of the membrane shall be cleaned of all debris, dust, and foreign material. This may require the use of water, detergents, and other cleaning agents approved by the roofing system manufacturer. Contractor will be responsible for providing the necessary items to perform this task. Do not use any abrasive pads that can score the polymer.

3.3 Base Flashings Installation

3.3.1 Roll out the membrane to be used for base flashings and allow to relax in accordance with the roofing system manufacturer’s written instructions.

3.3.2 Flashing pieces shall extend onto the roof a minimum 3 inches past the roof membrane fasteners at the edge of the sheet and up the vertical surface a minimum of 8 inches.

3.3.3 Fully adhere the flashing to the substrate using the roofing system manufacturer’s approved flashing adhesive.

3.3.4 Base flashing shall be smooth to the substrate, and wrinkles in base flashing shall be grounds for rejection.

3.3.5 If base flashings terminate at a corner and edges would be exposed, furnish and install new 4-inch x 4-inch L-type membrane-clad metal closures with an exterior edge caulking cove. If base flashings terminate at walls and edges would be exposed, furnish and install new 4-inch-wide L-type membrane-clad metal closures with an exterior edge caulking cove. The closure shall be set in water cut-off mastic or butyl tape, and fastened to the substrate using appropriate fasteners at spacings not to exceed 12 inches on center. Completely hot air weld the base flashings to the membrane-clad metal. Apply a non-shrinking sealant, such as NP-1 or approved equal, to the caulking cove at the exterior edge of the closure. Completely remove all residual asphalt from the substrate prior to installing any sealant or caulking.

3.3.6 At inside and outside corners of curbs and parapets, Contractor shall use the roofing system manufacturer’s pre-fabricated corner pieces. The use of field-fabricated pieces is not acceptable. Pre-

fabricated pieces shall be installed in accordance with the roofing system manufacturer's written instructions.

3.3.7 At locations where base flashing seam transition from vertical to horizontal, the contractor shall furnish and install new unsupported patches at these locations shall extend a minimum of 3 inches past the transition, centered over the seams in all directions.

3.3.8 Use the roofing system manufacturer's termination bar at base flashing that exceed 36 inches in height. Install rows of termination equally spaced up the wall. Fastener spacings not to exceed 8 inches on center. Set flashing in water cut-off mastic, set the bar over the edge of the base flashing, and apply caulk at the top of the flashing.

3.3.9 At a minimum, extend base flashings up and over the top horizontal surface of curbs and inside the curb a minimum of 1 inch, unless otherwise stated in specification or shown on drawings.

3.3.10 Extend the base flashing over the top of the parapet and down the outside face of the wood blocking. Base flashing shall extend down past the outside face of the parapet wood blocking a minimum of 1 inch. Fully adhere the membrane to the wood blocking and fasten to the vertical face of the wood blocking using roofing nails at spacings not to exceed 12 inches on-center. Set the edge of the membrane in continuous multi-purpose tape.

3.4 Expansion Joints: Install new membrane expansion joints as indicated on drawings. Secure the field membrane at the base of curbs as specified herein. Form a membrane envelope that matches the depth of the curb and roof insulation. Fill envelope with batt insulation. Furnish install continuous foam core over the opening. Cover the joint and foam core with the base flashings and/or additional membrane as indicated on drawings. Reinforce the seams over the expansion joint with additional membrane that shall extend a minimum of 3 inches past the expansion joint seams in every direction.

3.5 Heat Welding

3.5.1 Hot air weld all sheet seams using either a machine or hand-held hot air welder approved by the roofing system manufacturer. A copy of the operating instructions shall be provided to the Designer prior to the start of the project.

3.5.2 Monitor the temperature of the hot air welder so as to minimize the amount of smoke that should develop and to ensure that the material from the bottom of the sheet begins to soften and flow from the seam. Hand held welders shall insure that membrane welding is immediately followed by a hand roller to press the heated membrane surfaces together with slow, even movements.

3.5.3 All seams shall be manually probed using a blunt rounded instrument daily. Any fishmouths or other seam defects where the seam is not fully adhered shall be repaired in accordance with the roofing system manufacturer's instructions.

3.5.4 After seams have set for approximately 8 hours, the Contractor shall make a minimum of 3, 2" x 12" test cuts across the seam, with at least one of the test cuts taken from the first seam of the day. If multiple welders are used, the minimum test cuts are applicable to each welder used. Test cuts shall be repaired by the Contractor daily and shall be done at no additional cost to the Owner. In lieu of test cuts, the contractor may perform peel tests. Peel test shall be performed with two 4" x 12" pieces of membrane that shall be welded together 1-1/2 inch for the machine welder and 2 inches for hand welders. The membrane shall be pulled apart across the seam. Test shall be dated, and one test shall be performed every time a welding device is turned on. An archive of test shall be available for Designer inspection.

Peel-test shall only be considered successful if:

a) there is a complete cohesion failure in a polymer layer, and/or

b) there is an adhesion failure between a polymer layer and the scrim.

c) Other instances as stated in writing by the membrane manufacturer.

3.5.5 Seams shall be tested in accordance with the roofing system manufacturer's instructions and evaluated for seam integrity. Seams that fail this test shall be subject to additional test cuts, as directed by the Designer and/or roofing system manufacturer, in order to further quantify the extend of the deficient condition. Repairs to deficient seams and/or test cut locations shall be performed by the Contractor at no additional cost to the Owner.

3.5.6 Seal the edges of the membrane where the reinforcing fabric is cut with the roofing system manufacturer's approved seam sealant. Such work shall be done on a daily basis.

3.6 Pipe Flashing Installation

3.6.1 Pipe penetrations shall be flashed using pre-manufactured pipe flashings. Cut the pipe flashing so that it will fit tight to the pipe penetration. Ensure that the field membrane is secured at the base of the pipe as required herein. Fully weld the pipe flashing flange to the field membrane in accordance with membrane manufacturer written instruction. Set the pipe flashing in water block against the pipe penetration, and secure the top of the pipe flashing to the pipe using a draw-band clamp. Seal the top of the pipe flashing to the pipe penetration using NP-1 sealant, or approved equal.

3.6.2 At locations where pre-manufactured pipe flashing cannot be installed, the contractor may field flash the pipe penetration. Field flashing shall extend onto the roofing membrane a minimum of 2 inches past the membrane fasteners. Field flashing shall extend up of the pipe penetration a minimum of 6 inches. The top of the field flashing shall receive water block, draw-band clamp, and sealant in accordance with Paragraph 3.5.1 above. At square penetrations, secure the top edge of the field flashing using a self-adhering membrane stripping membrane. Prime the penetration and membrane prior to applying the self-adhering membrane.

3.6.3 Install any necessary pre-molded pitch pans in accordance with manufacturer written instructions. Prior to applying pourable sealer, seal the penetration though the membrane with sealant.

3.7 Walkway Pad

3.7.1 Apply one row of walkway pads around all roof access hatches, at the base of roof access doors, at the top and bottom of ship ladders, and as shown on drawings. Install walkway pads in accordance with the roofing system manufacturer's written instructions. Refer to Drawings.

3.7.2 Walkway pads shall be spaced approximately 1 inch apart. Leave small opening on the downslope side of walkway pads to allow for any water beneath the pads to exit.

3.7.3 Clean the surface of the membrane to receive the walkway pads in accordance with the roofing system manufacturer's written instructions. Fully adhere the walkway pad to the membrane and hot-air weld all sides of the pads to the surface of the membrane in accordance with the roofing system manufacturer's written instructions.

3.8 Field Quality Requirements:

3.8.1 Manufacturer's Field Services: Upon Owner's request, provide material manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.8.2 Minimum Manufacturer Inspections: Provide inspections by a Technical Representative employed by the roofing system manufacturer whom shall not perform any sales functions. Contractor shall complete any

necessary repairs required for issuance of warranty. Minimum schedule of material manufacturer inspections:

3.8.2.1 Pre-Construction Conference

3.8.2.2 Mock-Up Evaluation

3.8.2.3 25% Completion

3.8.2.4 50% Completion

3.8.2.5 Final Completion

3.8.3 Contractor shall provide Owner and Designer a copy of the manufacturer's inspection report within 48-hours of each inspection.

3.9 Prior to final inspection, the surface of the membranes shall be cleaned of all debris, dust, and foreign material. This may require the use of water, detergents, and other cleaning agents approved by the roofing system manufacturer. Contractor will be responsible for providing the necessary items to perform this task. Do not use any abrasive pads that can score the polymer.

END OF SECTION

SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 Summary: Includes the fabrication and installation of sheet metal and related accessories associated with roofing membranes, providing physical protection to membrane, base flashings and membrane terminations, as specified herein.

1.2 Related Work:

1.2.1 Section 02 41 13 – Selective Demolitions and Preparations

1.2.2 Section 06 10 53 – Miscellaneous Rough Carpentry

1.2.3 Section 07 22 16 – Roof Board Insulation

1.2.4 Section 07 54 19 – Polyvinyl Chloride (PVC) Roofing

1.2.5 Section 07 54 23 – Thermoplastic Polyolefin (TPO) Roofing

1.2.6 Section 22 14 00 – Roof Drains

1.3 Submittals: In accordance with Section 01 33 00 of this Specification

1.4 Environmental Conditions**:** Material installation shall proceed only when weather conditions are in compliance with the applicable manufacturer's recommendations for installation and no precipitation is imminent. Materials installed during adverse weather conditions shall be subject to removal and replacement with new materials at no additional cost to Owner.

1.5 Warranty: In accordance with Section 01 78 36 of this Specification.

PART 2 - PRODUCTS

2.1 General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

2.2 Galvanized Steel: Structural quality galvanized steel Coating Class G-90, ASTM A653.

2.3 Stainless Steel: Type 316 (16% chromium, 10% nickel, and 2% molybdenum) ASTM A240, mill finished.

2.4 Termination Bar**:** ¼” x 1” aluminum.

2.5 Kynar 500-Based Finish: Shall be factory applied, oven-finish. Finish and primer shall be applied in strict accordance with the formulator's specifications and shall meet the performance criteria of AAMA 605.2-90 specification. Finish coat thickness shall be a minimum of 1.0 mil. Primer coat thickness shall be a minimum of 0.3 mil. Color to match the existing color to be selected by owner.

2.6 Non-Shrinking Sealant: ASTM C920, Type S or M, Grade NS, Class 25, for Use NT, M, A, and O.

2.7 Manufacturer’s approved liquid applied flashing at drains.

2.8 Pop rivets: 1/8" diameter stainless steel pop rivets color to match adjoining metal.

2.9 Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

2.9.1 Fasteners:

2.9.1.1 Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.

2.9.2 Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

2.9.3 Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim to remain watertight.

2.9.4 Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.9.5 Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

2.10 Minimum Acceptable Metal Weights (All metal to be finished with Kynar 500 coating or approved equal prior to bid unless otherwise specified).

2.10.1	Conductor Head:	24-gauge galvanized steel
2.10.2	Coping:	24-gauge galvanized steel
2.10.3	Coping Cleat:	22-gauge galvanized steel
2.10.4	Counterflashing:	24-gauge galvanized steel
2.10.5	Downspout:	24-gauge galvanized steel
2.10.6	Rake Edge Metal Flashing:	24-gauge galvanized steel (membrane clad)
2.10.7	Rake Edge Metal Flashing Cleat:	22-gauge galvanized steel
2.10.8	Overflow Scupper:	0.040-inch-thick aluminum (membrane clad)
2.10.9	Overflow Scupper Exterior Flange:	0.040-inch-thick aluminum
2.10.10	Primary Scupper:	0.040-inch-thick aluminum (membrane clad)
2.10.11	Primary Scupper Exterior Flange:	0.040-inch-thick aluminum

PART 3 - EXECUTION

3.1 General Installation Requirements:

3.1.1 Inspect all surfaces to which metal is to be applied. Do not install metal unless surfaces are even, sound, clean, dry and free from defects which might affect the application.

3.1.2 Follow recommendations of the National Roofing Contractors' Association (NRCA) and Sheet Metal and Air Conditioning Contractors National Association Architectural Sheet Metal Manual (7th Edition) for fabricating in-shop and on-site, and for installation, unless otherwise specified herein.

3.1.3 Follow published instructions of the product manufacturer for installation of extruded or proprietary

metal products, unless otherwise specified herein.

3.1.4 Metal flashings installed at edges and/or parapets of low-sloped roofing shall adhere to ANSI/SPRI ES-1 wind uplift requirements, as necessary. Specified fastening along with metal flashing thicknesses, gauges, and/or weights listed herein are the minimum required. In the event additional fastening or thicker, lower gauge, or heavier metal flashings are required, the contractor shall satisfy the requirements of ANSI/SPRI ES-1. In some instances, shop-formed metal flashings cannot satisfy ANSI/SPRI ES-1 requirements without additional testing or proprietary systems are necessary. Such cost for testing and/or propriety systems shall be included in the Bid as required.

3.1.5 Use nails, screws, bolts, cleats or other fasteners of the same material or of material chemically compatible with the contacted metal.

3.1.6 Fabricate cleats to be a minimum of one gauge heavier than fascia metal.

3.1.7 Do not place dissimilar metals in direct contact or in positions where water sheds across both metals.

3.1.8 Install metal to be water and weather tight with lines, arises and angles sharp and true and with paint surfaces free of waves and buckles.

3.1.9 Install shop-formed metal flashings in 10-foot lengths maximum with a minimum number of pieces in each straight run.

3.1.10 Shop-form all metal shapes, which are to be formed of prefinished metal, with protective plastic film in place. Do not remove plastic film until just prior to (or, if possible, after) installation.

3.1.11 At all corners, shop form corner pieces of fascia and drip edge flashing from a single section of metal with minimum 36-inch legs on either side of the corner.

3.1.12 Cleats: Cleats shall be secured with nails that penetrate the wood a minimum of 1 inch at spacings not to exceed 6 inches on center. Nails shall be applied along the vertical face of the wood blocking and located approximately 1-3/4-inch from the bottom of the cleat. Metal flashing drip legs shall be fold snugly over the cleat.

3.1.13 Flat Drive Cleats: Refer to NRCA Detail SM-01 and Drawings. Lap vertical sections a minimum of 3-inches and hem the top of the sections. Apply the flat drive cleat and fold down the outside face of both sides of the coping 1 inch, snug to the vertical flange of the coping. Trim excess flat drive cleat from the vertical face of the coping.

3.1.14 Lapped Metal: Refer to NRCA Detail SM-01 and Drawings. Apply a continuous bead of caulk between any lapped metal sections, except for counterflashing lapped joints. The application of caulk after metal components have been lapped is unacceptable and will be grounds for rejection.

3.2 Coping Cap Installation

3.2.1 Prior to the installation of the coping cap, verify single-ply base flashing extends up and over the existing wood blocking and down the exterior vertical face beyond the wood blocking a minimum of 1 inch or a distance to match the length of the coping.

3.2.2 Coping shall be applied at locations where fastener height will not be less than 8 inches above the new roof surface. A-style flashing shall be applied where parapet height is below 8 inches.

3.2.3 Any deviations to the design shown in the Drawings shall be submitted to the Engineer for approval along with documentation that the revised detail meets the ANSI/SPRI ES-1 wind uplift requirements.

3.2.4 Use maximum 10-foot lengths and a minimum number of pieces in each straight run.

3.2.5 Secure both vertical legs of the coping with a continuous cleat nailed to the wood blocking. The coping drip edge shall be folded snugly over the cleat. Cleats shall be secured with nails that penetrate the wood a minimum of 1 inch at spacings not to exceed 6 inches on center. Nails shall be applied along the vertical face of the wood blocking.

3.2.6 Join sections with flat drive cleats. Refer to the Drawings. Lap vertical sections a minimum of 3 inches and hem the top of the sections. Apply the flat drive cleat, fold the drive cleat ends down the outside face of the coping, and fold the drive cleat ends under the cleat on both sides of the coping.

3.2.7 At locations where coping intersects at corners, the Contractor shall join sections with double lock standing seams as shown in the Drawings.

3.3 Counterflashing Installation

3.3.1 Exposed flashing shall be prefinished roll-formed 24-gauge galvanized steel with “Kynar 500” resin fluoropolymer. Color shall be selected by Owner from manufacturer’s standard color selections.

3.3.2 Provide flashing in 10-foot-long sections shop formed.

3.3.3 Anchors shall be provided at 6” o.c. unless otherwise noted or in accordance with the manufacturer’s requirements if more stringent.

3.3.4 Notch and lap sections a minimum of 3 inches.

3.3.5 At places where the counterflashing is being installed behind a frame or existing sheet metal flashing, slide counterflashing behind frame/existing flashing a minimum of one inch. Furnish and install stainless steel bonded neoprene washers with screws to secure counter flashing to curbs at spacings not to exceed 12” o.c.

3.3.6 At places where counter flashing will be surface-mounted, form a sealant cove at the top of the counterflashing. Apply termination bar over the counter flashing and secure the counter flashing and termination bar to the substrate using appropriate fasteners at spacings not to exceed 6” o.c. Fill the cove with sealant.

3.3.7 Notch and lap joints and inside corners. Notch and seam outside corners. Do not rivet or otherwise secure joints and corner. To the extent possible, form corners from a single piece that extends 5 feet on either side of the corner.

3.4 Scupper Liner Installation

3.4.1 Furnish and install new primary scupper. Refer to SMACNA Architectural Sheet Metal Manual Figure 1-26A and 1-26B. Also refer to Drawing No. 1/A-502.

3.4.2 Furnish and install new overflow scupper. Refer to SMACNA Architectural Sheet Metal Manual Figure 1-30A and 1-30B. Also refer to Drawing No. 2/A-502.

3.4.3 Scupper liner and interior flange shall be formed from membrane-clad metal. Any necessary seams shall be set in sealant, lapped a minimum of 1 inch, and pop riveted with stainless steel pop rivets at spacings not to exceed 1 inch on-center. The seam shall then be covered with a continuous strip of unsupported membrane flashings that shall be full welded to the metal.

3.4.4 Apply two continuous beads of sealant on membrane flashings to be in contact with scupper. Set the flange over the sealant and wall and secure to the substrate with specified fasteners at spacings not to exceed 6 inches and a minimum of 2 fasteners per side.

3.4.5 Flash the interior flange with membrane flashings per manufacturer's written instructions that shall extend to the edge of the scupper opening and a minimum of 6 inches past the scupper liner interior flange.

3.4.6 Set the exterior flange against the wall in a bead of non-shrinking sealant. Secure the exterior flange to the wall with a row of fasteners located approximately one inch from the edge, spaced no more than 6 inches on center. Hem the scupper liner to the exterior flange and set the seam in continuous sealant. Hem the exterior edges of the exterior flange towards the wall and seal the top edge to the cladding.

3.4.7 Furnish and install a section of surface mounted counterflashing above the exterior scupper flange in accordance with Section 07 60 00 Paragraph 3.4 of the Specification. The counterflashing shall extend a minimum of 1" beyond the ends of the scupper flange.

3.5 Conductor Head Installation

3.5.1 Furnish and install new conductors at all through-wall scupper locations. Refer to SMACNA Architectural Sheet Metal Manual Figure No. 1-27A.

3.5.2 Size the conductor in accordance with the following requirements:

Face Width: 4 times downspout width

Face Depth: 2 times downspout width

Height: 4 times downspout width

3.5.3 Sealant shall be applied between all lapped joints. The application of caulk at lapped joints after sections are joined is not acceptable.

3.5.4 Install conductor so that the top is 1-inch lower than the scupper opening. Secure to the wall with a minimum of 2 specified friction fasteners near the top corners. Outside edges of the scupper shall be turned out onto the back of the conductor a minimum of one inch.

3.5.5 The outlet tube shall be fabricated to extend into the downspout a minimum of 4 inches.

3.6 Downspout Installation

3.6.1 Downspouts shall be box-style and shall be 4" x 5" unless otherwise noted. Refer to SMACNA Architectural Sheet Metal Manual Figure No. 1-32B and 1-32F.

3.6.2 Lap sections a minimum of 3 inches and secure sections with a minimum of 2 stainless steel sheet metal screws.

3.6.3 Form 45° elbow where water discharges onto the roof or ground.

3.6.4 Form or provide new round to rectangular downspout metal transition pieces to tie into existing underground drainage system formed from the same material as the downspouts.

3.6.5 Form downspout hangers from the same material as downspouts using material not less than 2 gauges heavier than downspouts. Secure downspouts to wall with hangers spaced not more than 5 feet on center. Refer to SMACNA Architectural Sheet Metal Manual Figure 1-35H. Apply one coat of metal primer and two coats of field-grade Kynar 500 paint to all hangers. Color shall match the downspouts.

3.6.5.1 Locate downspout hangers at same locations as existing downspout hangers and to cover existing hanger fastener holes. Seal holes in exterior cladding from existing hanger fasteners.

3.6.6 Furnish and install new splash blocks where water discharges onto new roofing or grounds. Refer to SMACNA Architectural Sheet Metal Manual Figure No. 1- 36.

3.6.6.1 Where splash blocks are installed on new roof surfaces, furnish and install new sacrificial walk pad under all splash blocks. Membrane protection pads shall extend a minimum of 3 inches beyond all sides of the splash block and shall be adhered to the roof surface.

3.7 Rake Edge Flashing**:**

3.7.1 At locations shown on drawings, furnish and install new two-piece eave flashing. Refer to drawings and NRCA Detail UL-44. Any deviations to this basic design shall be submitted to the Engineer for approval along with documentation that the revised detail meets the ANSI/SPRI ES-1 wind uplift requirement.

3.7.2 Prior to installing the flashing, ensure that single-ply membrane extends down the cladding a distance that matches the length of the existing flashing and extends past the exterior wall finish a minimum of 1-inch.

3.7.3 Use maximum 10-foot lengths and a minimum number of pieces in each straight run.

3.7.4 The eave flashing shall engage a continuous spring cleat with integral water dam. Set the cleat in a continuous bead of sealant down its length on top of the membrane. The cleat shall be secured to the substrate with appropriate fasteners at spacings required by the flashing manufacturer but fasters shall be applied through the horizontal flange a maximum of every 24-inches and through the vertical flange a maximum of every 6-inches.

3.7.5 The flashing shall cover the exterior wall cladding a distance to match the existing; however, the vertical flange of the flashing shall not be more than 8-inches. If additional area of wall needs to be covered with flashing to match the existing, furnish and install new face extenders. Install face extender prior to installing flashing.

3.7.6 Apply an additional strip of flashing membrane fully adhered to the cleat and welded to the field membrane in accordance with the manufacturer’s written instructions.

3.7.7 Cover the cleat and additional flashing membrane with the two-piece fascia cover. Lap sections a minimum of 3 inches so water runs across the lap and set in two continuous beads of sealant unless the manufacturer has differing requirements.

3.7.8 Apply membrane manufacturers approved cut edge sealant along the cut edge of the membrane.

3.8 Cleaning and Protection

3.8.1 Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

3.8.2 Clean and neutralize flux materials. Clean off excess solder.

3.8.3 Clean off excess sealants.

3.8.4 Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in

clean condition during construction.

3.8.5 Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

DIVISION 22

PLUMBING

SECTION 22 05 29
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 Summary: installation of non-penetrating, rooftop support system for roof-mounted gas piping.

1.1.1 Existing copper P-traps and condensation lines will remain.

1.1.2 Existing PVC P-traps and condensation lines will be replaced with copper.

1.2 References:

1.2.1 ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

1.2.2 ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

1.2.3 ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.

1.2.4 ASTM B88 - Standard Specification for Seamless Copper Water Tube

1.2.5 ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings

1.2.6 ASTM B302 - Standard Specification for Threadless Copper Pipe, Standard Sizes

1.2.7 MSS SP-58 - Pipe Hangers and Supports -- Materials, Design and Manufacture; Manufacturers Standardization Society of the Valve and Fittings Industry.

1.2.8 MSS SP-69 - Pipe Hangers and Supports -- Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry.

1.3 System Description: Support piping on roof with an engineered prefabricated pipe support system designed for installation without roof penetrations, flashing or damage to the roofing material. The system shall consist of bases, made of high density polypropylene or polycarbonate plastics with UV Protection, a HDG structural steel frame and suitable pipe hangers for the application. Nuts, threaded rods and washers shall be HDG, spring nuts and bolts for spring nuts will be electro-plated. System shall be custom designed to fit piping and conduit to be installed and the actual conditions of service.

1.4 Submittals:

1.4.1 Submit under provisions of Section 01 33 00.

1.4.2 Product Data: Submit for all products proposed for use, describing physical characteristics and method of installation.

1.4.3 Shop Drawings: Show installation layout, sizes of units, and details of installation.

1.5 Quality Assurance:

1.5.1 Manufacturer Qualifications: Company specializing in manufacturing pipe support systems, with a minimum of five years of documented experience.

1.6 Delivery, Storage, and Handling:

1.6.1 Deliver all materials to project site in manufacturer's original packaging, marked with manufacturer's name, product model names and catalog numbers, identification numbers, and other related information.

1.6.2 Store materials under cover until needed for installation.

PART 2 – PRODUCTS

2.1 Manufacturers:

2.1.1 Acceptable Manufacturers:

2.1.1.1 Miro Industries, 844 South 430 West Suite 100, Heber City, Utah,

2.1.1.2 CADDY, a registered trademark of Erico International Corporation, 31700 Solon Road, Solon, Ohio,

2.1.1.3 PHP Systems, 5534 Harvey Wilson Drive, Houston, Texas,

2.1.1.4 or approved equal prior to bid.

2.2 Materials:

2.2.1 Support Spacing: 8 feet unless otherwise specified by the manufacturer and within 12 inches of elbows and junctures.

2.2.2 Copper: ASTM B88, cold rolled temper, 20 oz. Copper to meet Federal Specification QQ-C-576b. Copper to be commercially pure alloy 110. Surfaces shall be free of all water staining and weathering oxides.

2.2.3 Solder: ASTM D32-66T with 50% lead and 50% tin unless otherwise specified. Follow manufacturer's recommended soldering procedures.

2.2.4 Splashblock: Made of recycled material.

2.2.4.1 ***Basis of Design:*** Recycle material splashblock with edge on three sides, one open edge. Weight: 30lbs/30.61kg, Height 3”/7.62cm, Length:34”/86.36cm, Width:12”/30.48cm

2.2.4.2 Or approved equal prior to bid.

2.2.5 3-RAH-12 with polycarbonate base and roller for piping up to 3” in diameter.

2.2.6 6-RAH-12 with polycarbonate base and roller for piping up to 6” in diameter.

2.2.7 Two (2), Model 2.5-Conduit Support-2 for electrical juncture boxes.

2.2.8 Model 1.5 for condensation lines.

2.2.9 Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.

2.2.9.1 Corrugated stainless-steel tubing with polymer coating.

2.2.9.2 Operating-Pressure Rating: as required for existing conditions.

2.2.9.3 End Fittings: Zinc-coated steel.

2.2.9.4 Threaded Ends: Comply with ASME B1.20.1.

2.2.9.5 Maximum Length: 24 inches

2.2.10 Refer to manufacturer recommendations for line and piping support.

PART 3 – EXECUTION

3.1 Examination: Verify that roofing system is complete and that roof surfaces are smooth, flat, and ready to receive work of this section.

3.2 Preparation:

3.2.1 Clean surfaces of roof in areas to receive portable support bases.

3.2.2 Use care in handling portable support system components during installation, to avoid damage to roofing, flashing, equipment, or related materials.

3.2.3 Furnish and install new copper condensation lines with P-traps at all HVAC units. Size lines to fit snugly to drainage outlets. P-Trap stem length shall be 2 times the HVAC drainage outlet diameter, and returns shall be equal to half of the stem. Consult HVAC manufacturer for additional recommendations.

3.2.4 Extend line to nearest primary drainage facility.

3.2.5 Using a jelly flux, solder copper lines and fittings in accordance with solder manufacturer recommendations.

3.2.6 Threaded copper lines and fitting may be used in lieu of solder.

3.2.7 Raise gas lines so that they are a minimum of 12 inches above the finished roof height. Furnish and install new outdoor flexible connections at units.

3.2.8 Wire brush existing gas lines to remove all scaling rust and existing paint. Prime existing gas lines using Sherwin Williams Kem Kromik metal primer, or approved equal, and allow to dry. Apply two coats of Sherwin Williams All Surface Enamel Latex Base, or approved equal, over all gas lines using safety yellow paint.

3.2.9 Existing and/or new roofing shall be adequately protected during this phase of the work. Should rust stains or paint discolor new roofing the Contractor shall install additional cap sheet at affected areas at no additional cost to the Owner.

3.3 Installation:

3.3.1 Locate bases and support framing as specified herein.

3.3.2 The use of wood for supporting piping is not permitted.

3.3.3 Furnish and install walkway protection pads. Walkway pads shall be partially adhered with a spot application of flashing cement to the substrate. The pad shall be a minimum of 18" x 18" in size, but shall be a minimum of 12 inches wider than the base.

3.3.4 Adhere support bases in the middle of walkway protection pads using continuous double-sided butyl tape

on all four sides of the base. Leave a minimum 1-inch gap at each side for nominal water exit underneath base.

3.3.5 At condensation lines, secure the condensate lines to the plastic bases using steel U-clamps and nails. Extend all lines to the nearest outlet. Set the plastic bases in double-sided butyl tape on a nominal 12" x 12” walkway pad.

3.3.6 Once all supports are in place, adjust the height of supports so that piping is uniformly loaded.

3.3.7 Install pipe supports in accordance with manufacturer written instructions.

3.4 Cleaning and Protection:

3.4.1 Remove all packaging, unused fasteners, adhesive, and other installation materials from the project site.

3.4.2 Remove adhesive from exposed surfaces of supports and bases, and leave the work in clean condition.

3.4.3 Provide protection as required to leave the work in undamaged condition at the time of substantial completion.

END OF SECTION

SECTION 22 14 00
ROOF DRAINS

PART 1 - GENERAL

1.1 Work Included

1.1.1 Installation of new cast iron drain bowls, domes, clamping rings, fasteners, and first 10-feet of drain leaders at all existing drains.

1.1.2 Installation of new cast iron drain bowls, domes, clamping rings, fasteners, and drain leaders at all new drain locations.

1.2 Related Work

1.2.1 Section 02 41 13 – Selective Demolition and Preparations

1.2.2 Section 06 10 53 – Miscellaneous Rough Carpentry

1.2.3 Section 07 22 16 – Roof Board Insulation

1.2.4 Section 07 54 19 – Polyvinyl Chloride (PVC) Roofing

1.2.5 Section 07 54 23 – Thermoplastic Polyolefin (TPO) Roofing

1.2.6 Section 07 60 00 – Flashing and Sheet Metal

1.3 References

1.3.1 ASME A112.6.4 – Standard Specification for Roof, Deck, and Balcony Drains.

1.3.2 ASTM C564 – Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

1.3.3 ASTM A888 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications

1.3.4 ASTM C1277 – Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.

1.3.5 Manufacturers Standardization Society SP-58-2009 – Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation.

1.4 Submittals:

1.4.1 In accordance with Section 01 33 00 of this Specification

1.4.2 Product Data: Manufacturer’s data sheets on each product to be used, including:

1.4.2.1 Preparation instructions and recommendations
1.4.2.2 Storage and handling requirements and recommendations
1.4.2.3 Installation methods

1.4.3 Shop Drawings: Plans and details of entire overflow drainage layout, showing drains, leaders, hangers, anchors, fittings, and evidence of compliance with structural performance requirements including sizes and part identification.

1.4.3.1 Include system layout, design analysis, and calculations prepared and sealed by a Registered Professional Designer licensed in the State where the project is located.

1.4.3.2 Include data regarding installation and rigging as well as all necessary Restrictive and Non-Restrictive General Safety and Usage Notes.

1.4.4 Operation and Maintenance Data:

1.4.4.1 Include parts catalog with complete list of equipment replacement parts; identify each entry with equipment descriptions and identifying part numbers.

1.4.4.2 Include technical information for servicing equipment.

1.4.5 Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.4.6 Close-out Submittals: Provide manufacturer's maintenance instructions that include recommendations for inspection frequency, periodic checking and adjustment of hangers/anchors, and other periodic cleaning and maintenance of all components.

1.5 Quality Assurance

1.5.1 Manufacturer Qualifications: Work of this Section to be executed by manufacturers specializing in the fabrication of the materials specified. Manufacturer shall have a minimum of 10 years of continuous, concurrent experience providing specified materials including the current year.

1.5.2 Installer Qualifications: Work associated with the installation of new drains, drain leaders, and piping shall be performed by a plumbing contractor licensed to perform such work in the state of South Carolina and shall have a minimum of 5-years of experience in this type of work.

1.6 Environmental Conditions

1.6.1 Material installation shall proceed only when weather conditions are in compliance with the applicable manufacturer's recommendations for installation and no precipitation is imminent. Materials shall not be installed when ambient temperature is below 40 degrees or above 110 degrees Fahrenheit. Materials installed during adverse weather conditions shall be subject to removal and replacement with new materials at no additional cost to Owner.

1.7 Warranty: Refer to Section 01 78 36 of the specification.

PART 2 – PRODUCTS

2.1 Acceptable Manufacturers:

2.1.1 Zurn Plumbing Products Group (Basis of Design)

2.1.2 Josam Company.

2.1.3 Smith, Jay R. Mfg. Co.

2.2 Roof Drains & Overflow Roof Drains:

2.2.1 Shall be a coated cast iron roof drain, having large cast iron locking dome, nonpuncturing clamp ring with integral gravel stop, large sump with wide roof flange, bottom outlet no-hub connection, deck clamp, sump receiver, and hardware packages included or equal. Provide adjustable extension sleeves to accommodate specified insulation thickness.

2.2.2 Roof Drain Receivers - Shall be a heavy gage galvanized steel pan manufactured by the cast iron drain manufacturer specifically designed to support the roof drain.

2.2.3 Roof Drain Extensions – Static or adjustable to allow the drain body to be applied at the height of the

surrounding insulation as specified.

2.2.4 Under Deck Clamping Ring - Shall be as manufactured by the cast iron drain manufacturer specifically designed to secure the roof drain to the roof deck and Roof Drain Receiver.

2.2.5 2-inch water dam shall be provided for overflow roof drains.

2.3 Cast Iron Piping and Accessories:

2.3.1 Cast Iron Drain, Waste, Vent (DWV) Piping and Fitting with integral flow sweeps: ASTM A888, CISP Standard 301. Cast Iron DWV Pipe/Fittings System as manufactured by Charlotte Pipe and Foundry, or approved equal prior to bid.

2.3.2 Diameter: Min. 4-inches

2.4 Insulation: Shall be 1-1/2" thick heavy density pre-formed fiberglass, single-seam pipe insulation with self-sealing lap, conforming to ASTM C-547, Class 2, similar or equal to Certainteed 500 degree, Snap-On-Pipe Insulation.

2.5 Fasteners – See Section 06 10 53 – Miscellaneous Rough Carpentry.

2.6 No-Hub Coupling:

2.6.1 4-band, No-Hub coupling meeting ASTM C1277. Coupling gaskets meeting ASTM C564. Model MD-44 as manufactured by Fernco Incorporated, or approved equal prior to bid.

2.6.1.1 For use connecting drains to leaders at less than 5-inches in diameter.
2.6.1.2 For use connecting piping less than 5-inches in diameter.

2.6.2 6-band, No-Hub coupling meeting ASTM C1277. Coupling gaskets meeting ASTM C564. Model MD-55 as manufactured by Fernco Incorporated, or approved equal prior to bid.

2.6.2.1 For use connecting drains to leaders greater than or equal to 5-inches in diameter.
2.6.2.2 For use connecting piping greater than or equal to 5-inches in diameter.

2.7 Pipe Hangers, Anchors, and Accessories:

2.7.1 Clevis Hanger: MSS-SP-58-2009, Type 1; hot-dip galvanized steel, felt lined, clevis hanger allowing for vertical adjustment of stationary, non-insulated pipe. Minimum design load of 4,800 pounds. Use in conjunction with 1-1/4” diameter threaded rod. B3100F, as manufactured by Cooper B-Line, or approved equal prior to bid.

2.7.1.1 Hanger shall fit snugly to bottom have of the perimeter of the pipe. Pipe hangers oversized or undersized shall be grounds for rejection.

2.7.2 Pipe Anchor: MSS-SP-58-2009, Type 4; Hot dipped galvanized steel pipe clamp designed to suspend pipe. Minimum design load of 3,060 pounds at 650 degree Fahrenheit. Use in conjunction with weldless eye bolt. B3140, as manufactured by Cooper B-Line, or approved equal prior to base bid.

2.7.2.1 Clamps shall fit snugly to the perimeter of the pipe. Pipe hangers oversized or undersized shall be grounds for rejection.

2.7.3 Threaded Rod: Electro-plated steel threaded rod designed for use with pipe hanger and clamp systems. 1-1/4 minimum diameter of threaded rod, as recommended by the approved pipe hanger system manufacturer. Standard threaded length of 5 inches. Design load of 9,500 pounds at 650 degrees Fahrenheit. B3205-1 ¼”, as manufactured by Cooper B-Line, or approved equal prior to bid.

2.7.3.1 At any locations where multiple threaded rods are required, the contractor shall join sections with a forged steel, electro-plated finished turnbuckle as recommended by the approved pipe hanger system manufacturer. Design load of 9,500 pounds at 650 degrees Fahrenheit.

2.7.3.2 B3202-1 ¼", as manufactured by Cooper B-Line, or approved equal prior to bid.

2.7.4 Weldless Eye Bolts: Electro-plated forged steel weldless eye bolt designed for use with pipe clamp systems. For use with 1-1/4" minimum diameter threaded rod, as recommended by the approved pipe clamp system manufacturer. Design load of 9,500 pounds at 650 degrees Fahrenheit. B3200-1 ¼", as manufactured by Cooper B-Line, or approved equal prior to bid.

2.7.5 Beam Clamp: MSS-SP-58-2009, Type 29, electro-plated, forged steel with weldless eye nut and links. For use with 1-1/4" minimum diameter threaded rod, as recommended by the approved pipe clamp system manufacturer. Design load 11,500 pounds. B3296, as manufactured by Cooper B-Line, or approved equal prior to bid.

PART 3 – EXECUTION

3.1 General Installation Requirements

3.1.1 Inspect all surfaces to which drainage system is to be applied. Do not install unless surfaces are even, sound, clean, dry, and free from defects which might affect the application.

3.1.2 Examine project prior to installation and report in writing to Owner and Designer any defects or other site conditions that would cause problematic installation products or possible deficiency.

3.1.3 Follow published instructions of the product manufacturer for installation of extruded or proprietary metal products, unless otherwise specified herein.

3.1.4 Use nails, screws, bolts, cleats, or other fasteners as recommended by the approved drainage system manufacturer.

3.1.5 Changes to pipe in size or direction shall be made with pre-manufactured fittings.

3.2 New Drain/Overflow Drain Installation

3.2.1 Remove existing drain components, bowls, piping, strainers, and the first 10-feet of existing horizontal drain leaders.

3.2.1.1 Drain leader removal may stop prior to 10-feet of removal if the entire leader is removed up to the riser. Removal of riser is not desired.

3.2.1.2 Existing pipe hangers shall be removed and replaced at removed leader locations.

3.2.2 Shorten or lengthen existing drain leaders as necessary to allow installation in accordance with detail drawings.

3.2.3 Furnish and install specified roof drains with flat drain receivers, clamping rings, dome strainers, and under-deck clamps at locations indicated on drawings.

3.2.4 Install flat drain receivers to the top flat portion of the deck. Fasten the receivers with Tek 5 screws through the top flat portion of the deck, approximately 1-inch from the edge of the pan. Fasteners shall penetrate through the decking a minimum of 3/4 inches.

3.2.5 Set the height of the drain bowl so that the top of the bowl is flush with the top of the surrounding sump insulation using static and adjustable extensions, as required. Install extensions in accordance with manufacturer recommendations.

3.2.6 Connect the drain bowl to the new drain leaders using 4-band no-hub clamps. Apply new minimum R-10 insulating wrap on the underside of the drain bowl and onto the drain leader for 60-feet. Refer to Drawings.

3.2.7 Install new drains in accordance with membrane manufacturer's recommendations and detail drawings in this specification.

3.3 New Drain Horizontal Piping Installation:

3.3.1 Furnish and install new cast iron pipe as shown on plans and approved shop drawings. Drains and leaders shall be 4". Pipes shall maintain a minimum slope of 1/8" per foot to provide a gravity flow to existing piping.

3.3.2 New piping will be same size as existing (minimum 4-inch diameter). No transitions to smaller sizes are allowed in the direction of flow.

3.3.3 In accordance with South Carolina plumbing code, furnish and install a cleanout at the upstream end of the new pipe.

3.3.3.1 At the pipe end, cleanouts shall be a combination wye with a bend where an adapter and raised nut cleanout plug is applied at the end of the flange. Connect the adapter to the wye with a minimum 4-band, no hub clamp.

3.3.4 Cut pipe sections square with the axis using a snap cutter or other method approved by the approved pipe manufacturer. Cut pipe a minimum of 2 inches from damaged or rusted areas.

3.3.5 Clean pipe, couplings, and pipe fittings of all oils, greases, foreign debris, or other containments that may interfere with the bonding process.

3.3.6 Apply the coupling to the first section pipe, extending the pipe to a depth of half the coupling. Set the pipe perimeter in a solid bead of water cut-off mastic.

3.3.7 Insert the second pipe section into the coupling and lightly press the two pipe sections together. While one person is pressing the pipes together, a second person shall tighten the coupling in accordance with the coupling manufacturer recommendations.

3.3.8 Where the new pipe ends, install a new cleanout that shall be a wye with the stem facing up and an adapter and raised nut cleanout plug at the wye stem. This shall be the end of the new pipe and the new cleanout wye flange shall connect to the new cast iron wye flange.

3.3.8.1 Refer to Specification section 07 60 00 for conductor head and downspout installation.

3.3.9 Adhere to manufacturer recommendations regarding cold weather and hot weather application of components.

3.3.10 Overflow pipes & primary drain pipes shall remain separate.

3.4 Horizontal Pipe Hangers and Anchors:

3.4.1 Furnish and install new pipe hangers as shown on plans and approved shop drawings. Drains and leaders shall be 4". Pipes shall maintain a minimum slope of 1/8" per foot to provide a gravity flow to the exterior of the building.

3.4.2 Apply clevis hangers at spacings not to exceed 10 feet on-center, however, utilize a minimum of four (4) equally spaced clevis hangers. Utilize threaded rod, locking nuts and washers, and beam clamps with

clevis hangers. Install clevis hanger assembly in accordance with approved system manufacturer recommendations.

3.4.3 Attach beam clamps to the top and bottom chord of roof joists.

3.4.4 Adjust and leave properly functioning equipment. Ensure that hangers promote pipe slope and that the hangers are snug to the pipe.

3.4.5 Apply pipe clamps (anchors) within 12 inches of the new drains and 12 inches of the end of the new pipe. Utilize threaded rod, weldless eye bolts, locking nuts and washers, and beam clamps with pipe clamps (anchors). Adjust and leave properly functioning equipment. Ensure that clamps promote pipe slope and that the clamps are tight to the pipe. Install pipe clamp (anchor) assembly in accordance with approved system manufacturer recommendations.

3.4.6 Hangers shall be applied within 12 inches of each pipe joint.

3.4.7 Adjust lengths of threaded rod to maintain proper slope requirements listed in this specification to ensure water flow to the exterior of the building.

3.4.8 At any location where threaded rod must be extended, utilize additional threaded rod and turnbuckles. Apply turnbuckles and additional threaded rod in accordance with suspension system manufacturer recommendations.

3.5 Operations/Cleaning

3.5.1 Ensure that all lines, drains, and other drainage system components are clean and clear of debris at the time of final acceptance by the Owner.

3.5.2 The Contractor shall water test all new drains prior to the final acceptance by the Owner.

3.5.3 The cost for any repairs or adjustments required to any new drainage system component as a result of a failed water test due to leaking, including the drain, connections, piping, hangers, anchors, pipe connections, pipe expansion joints, or any other new component of the drainage system, shall be borne by the Contractor at no additional cost to the Owner.

END OF SECTION

END OF SPECIFICATION