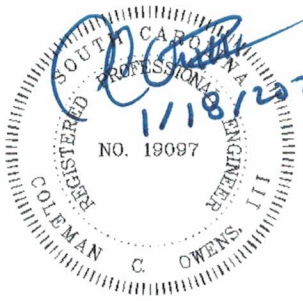
DIVISION NO. 15 – MECHANICAL



1/18/2022

SECTION 15010 – GENERAL MECHANICAL

PART ONE – GENERAL:

1.01 SCOPE:

A. The General Conditions and Special Conditions are a part of these specifications.

B. Drawings and specifications are complementary each to the other and what is called for by either shall be as binding as if called for by both.

C. Provide all supervision, labor, material, equipment, machinery, plant and any other items necessary for a complete, safe and quietly operating mechanical system.

D. Examine other drawings and specifications and bring to the attention of the Architect prior to bid time any omissions or discrepancies in this Division.

1.02 CODES, RULES, PERMITS, FEES, APPLICABLE PROVISIONS:

A. The Contractor shall comply with all local, municipal and state laws and the latest revision of the regulations of the National Electric Code, the International Building Code, the International Plumbing Code, the International Gas Code and the International Mechanical Code, in the performance of his work wherever these laws and regulations may apply.

B. The Contractor shall give all required notices, obtain necessary permits and pay all required fees.

C. Deliver to Architect, permit and licenses, including certificates from local and state health departments approving complete sanitary and water systems. Furnish certificates from fire department approving fire protection system and equipment.

D. Before and/or at completion of work, the Engineer shall cause to be made any and all tests which he may consider necessary. Should it develop during tests that the work is defective and does not comply with these specifications, such changes as are necessary shall be made to put the work in proper condition and the expense of such subsequent tests shall be borne by this Contractor.

E. The following requirements are supplementary to the tests specified for individual equipment and/or systems in this section of these specifications:

1. Concealed or insulated work shall remain uncovered until required tests have been completed, but in the event that the project construction requires it, the Contractor shall make arrangements for tests on portions of the work involved as the project progresses.

2. The Architect shall be notified in advance of all tests and shall be represented at such tests. The cost of labor, material, instruments, etc., required for tests shall be borne by the Contractor, except where specified elsewhere.

3. Acceptance tests for operation and performance as specified and/or required for all equipment and systems shall be in the presence of the Architect, a representative of the Owner, as well as representatives of agencies having jurisdiction, upon completion of the work.

1.03 DRAWINGS:

A. Project Drawings: The Drawings accompanying this specification are generally diagrammatic and do not show all details of bolts, nuts, connections and the like, required for the complete system and do not indicate the exact location of piping, fixtures, equipment, etc., unless definitely dimensioned or noted. While these drawings shall be followed as closely as possible, all dimensions shall be checked at the building and any necessary changes shall be made in accord with structural and architectural conditions, equipment to be installed or with the work of the different trades, without any additional cost to the Owner and as directed by the Architect. The drawings and specifications are complimentary to the other and what is called for by one shall be as binding as if called for by both. Any component item under this contract shall be furnished and installed by the Contractor without extra charge.

1.04 EXAMINATION OF CONDITIONS:

A. It is understood and agreed that the Contractor has, by careful examination, satisfied as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the general and local conditions and all other matters which can affect the work under this contract.

1.05 COORDINATION/COORDINATION DRAWINGS:

A. Coordinate work with other trades to avoid interference and establish necessary space requirements and tie-ins for each trade.

B. Prior to starting installation, furnish to the General Contractor and all Subcontractors concerned, copies of approved shop drawings showing location of equipment, piping, etc.

C. Schedule periodic meetings with other trades before and during installation to avoid conflicts and assure that pipes and equipment are installed in the best manner, taking into consideration head-room, maintenance, appearance and replacement.

D. The mechanical contractor shall produce either AutoCAD or Revit coordination drawings including the mechanical, electrical, plumbing, and fire sprinkler systems to be installed in order to avoid installation conflicts during construction. Coordination meetings shall be held after completion of these drawings to resolve potential installation conflicts. Additionally, a 3-dimensional drawing of the proposed mechanical room piping and equipment layout shall be generated and submitted to

the engineer for approval prior to any pipe or equipment installation in the main mechanical room. This drawing shall include all equipment to be installed in this space. Any mechanical equipment, ductwork, or associated appurtenance that is installed prior to receiving written coordination drawing approval from the engineer is subject to removal and replacement of all installed material at the contractor's expense. This relates to coordination and installation deficiencies with respect to the requirements of the contract documents as identified by the engineer, architect or the commissioning agent.

END OF SECTION 15010

SECTION 15040 – GENERAL COMPLETION

PART ONE – GENERAL:

1.01 GENERAL REQUIREMENTS FOR INSTALLATION:

A. Piping, fixtures, equipment, etc. shall be located to avoid interference with structural and architectural conditions or with the work of different trades. Provide off-sets where necessary to avoid footings, piers, columns, beams, windows, piping, electrical fixtures and other systems, etc. Specifically inform the General Contractor as to the correct size and location of all chases, openings, supports, sleeves, etc. required for the system. Furnish and install sleeves, inserts, bolts, etc. and all arrange for the cutting of walls, floors, roofs, etc. and the proper closing of all openings. Cutting of construction, where unavoidable, must be done by the General Contractor but shall be paid for by this Contractor. No part of the building may be broken out, cut, burned or permanently removed without the approval of the Architect.

PART TWO – PRODUCTS:

2.01 WORKMANSHIP AND MATERIALS:

A. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. The Contractor shall furnish the services of an experienced superintendent who will be constantly in charge of the erection of the work until completed and accepted.

B. Unless otherwise hereinafter specified, all materials and equipment shall be new, of best grade and as listed in printed catalogs of the manufacturer. Each article of its kind shall be the standard products of a single manufacturer.

C. The Architect shall have the right to accept or reject material, equipment and/or workmanship and determine when the Contractor has complied with the requirements herein specified. Where departures from indicated arrangements are required, written approval for such changes shall be obtained from Architect’s representative.

D. All manufactured materials shall be delivered and stored in their original containers. Equipment shall be clearly marked or stamped with the manufacturer’s name and rating.

E. All material and equipment used on this project shall be stored in a weatherproof bonded warehouse. Contractor shall submit insurance certificate to the Architect prior to storing any materials or equipment. No equipment, materials or roof-top heat pumps used on this project shall be stored outside exposed to the weather. Before final payment can be made, a notarized statement with the material invoiced to the Owner must be furnished to the Architect.

2.02 DIVISION OF WORK:

A. Coordinate all opening locations with General Contractor, see paragraph 2.04.

B. This Contractor shall furnish roof curbs and caps. Curbs and caps to be installed and flashed by the General Contractor, unless otherwise noted.

C. Furnish door grilles to General Contractor for installation.

D. Refer to the Electrical and Control Sections of this specification. The Electrical Subcontractor shall provide all wiring except:

1. Temperature Control Wiring
2. Equipment Control Wiring
3. Interlock Wiring

The Electrical Subcontractor shall furnish all power wiring complete from power source to motor or equipment junction box, including power wiring through starters. Electrical Subcontractor shall install all starters not factory mounted on equipment. The Mechanical Subcontractor shall, regardless of voltage, provide all temperature control wiring for equipment provided under this Division. The Mechanical Subcontractor shall furnish all starters and contactors to the Electrical Subcontractor and shall provide and be responsible for over-load heaters in all starters furnished. Over-loads shall be provided in each ungrounded conductor.

2.03 FINISHES:

A. Finishes for all water coolers, grilles, registers, diffusers, room fan coil units, room air conditioning units, louvers and any other item exposed to view shall be selected by Architect and shall be equivalent to baked enamel. Submit color charts along with submittal data.

2.04 OPENINGS – CUTTING, REPAIRING:

A. This Contractor shall cooperate with the work to be done under the other sections in providing information as to openings required in walls, slabs and footings for all piping and equipment, including sleeves, where required.

B. All drilling, cutting and patching required for the performance of work under this Section shall be performed by the General Contractor and the cost thereof shall be borne by this Contractor.

C. Holes in Concrete: Sleeves shall be furnished, accurately located and installed in for before pouring of concrete. This Contractor shall pay all additional costs for cutting of holes as the result of the incorrect location of sleeves. All holes through existing concrete shall be either core drilled or saw cut. All holes required shall have the approval of the Structural Engineer prior to cutting or drilling. All penetrations shall be grouted all around with cement.

2.05 EXCAVATION AND BACKFILL:

A. General: The Contractor shall do all excavating and backfilling necessary to receive the work shown on the drawings.

Excavations shall be made to the proper depth and the trenches shall be graded uniformly to provide a solid bearing along the entire length of the pipe. Bell holes shall be provided in trenches at the joints in hub and spigot pipe to facilitate caulking and so that piping will not be supported in hubs. All trenches shall be excavated so that pipes will have at least six (6) inches clearance on each side. Pipes in fill or loose sand shall have trench bottom tamped to 95% maximum density compaction prior to laying pipe.

B. Dewatering and Shoring: Pumps shall be furnished as required to keep trenches dry during the laying and jointing of the mains. Provide shoring where required, maintaining trenches against settlement until final acceptance.

C. Backfilling: Do not fill any trenches until all piping has been inspected. After the work is installed, tested, inspected and approved, the trenches shall be refilled in six (6) inch layers with clean, damp earth, with each layer thoroughly tamped before proceeding with additional layers. Remove from site all excess earth, rock and other debris resulting from excavation and backfill work.

2.06 NAMEPLATES:

A. On all manufactured equipment, provide engraved plastic nameplates as manufactured by Seton Nameplate Co., Columbia-Engravers, International Nameplate Co. or equal. Unless otherwise noted, nameplates shall be 1/16” thick plastic with white letters on a black background. Attach nameplates with two (2) round-head chrome plated screws.

B. Unless otherwise noted, letters identifying equipment in equipment rooms to be ½” high. All other letters shall be 1/8” high. Hand lettering, under typing tape, embossed letters on plastic, etc. will not be acceptable.

C. Provide additional nameplates for mechanical equipment that is suspended above lay in/accessible ceilings. Nameplates shall be located directly below suspended equipment and attached to the ceiling gird (not tiles) to indicate approximate location of equipment.

2.07 CLEANING EQUIPMENT AND MATERIALS:

A. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage. Provide adequate and proper storage facilities during the progress of the work. Special care shall be taken to provide for bearings, open connections, pipe coils, pumps and similar equipment.

B. All fixtures, piping, finished surfaces and equipment shall have all grease, adhesive labels and foreign materials removed.

C. All piping shall be drained and flushed to remove grease and foreign matter. Pressure regulating assemblies, traps, flush valves and similar items shall be thoroughly cleaned. Remove and thoroughly clean and reinstall all strainer screens after the system has been in operation for ten (10) days.

2.08 CLEANING UP:

A. Remove from the premises all unused material and debris resulting from the performance of work under this section.

2.09 DAMAGES:

A. Cost of repairing damage to building, building contents and site during the construction and guarantee period resulting from this work including damage to ceilings or walls is a part of this contract.

2.10 FINISHED PLANS:

A. As-Build Drawings: Upon completion of work, the Contractor shall furnish and deliver to the Owner two (2) sets of as-built drawings to correspond in size to the tracings, showing among other things, layouts of utility systems and functional systems (such as air distribution, water, storm drainage and sanitary sewer). All pertinent dimensions and elevations of buried work shall be given.

2.11 INSTRUCTIONS:

A. Provide a hard-back, three-ring file folder containing all warranties, catalog data and the manufacturer's recommendations and the frequency with which each is to be done. Each sheet shall be initialed by the manufacturer's agent as being correct. Provide columns on each sheet so that they may be dated by maintenance personnel when each individual function is performed. Contractor shall furnish a typed maintenance manual in hard-back, three-ring binder explaining all maintenance functions. The Contractor shall instruct and demonstrate each maintenance function to the Owner's Representative. The Owner's Representative shall in turn, sign the maintenance sheets indicating his/her understanding of the instructions. Coordinate all equipment start-ups with the Owner so that they may be present.

B. The Contractor shall instruct the Owner's Representative in complete detail as to the proper operation of the overall system. Advise the Owner as to where to order common replacement items. Deliver to the Owner, the manufacturer's agent's name, address and telephone number of each piece of equipment.

C. The Contractor shall provide a complete listing of filter sizes and counts of all mechanical equipment to Owner's Representative.

2.12 GUARANTEE:

The Contractor agrees:

A. Contractor shall correct defects in workmanship materials, controls and operation of the system for a period of 1 year from the date of substantial completion and acceptance of work. Any equipment/material installed by the contractor replaced during the first-year warranty period shall be guaranteed for an additional year starting from the date of replacement. A manufacturer 5-year parts and labor warranty shall be provided for all HVAC equipment that utilizes a compressor or compressors. This warranty shall cover the entire refrigeration system including the refrigerant. The manufacturer's warranty certificate shall be included in the contractor's closeout documents provided at the completion of the project.

B. That the systems installed will safely, quietly and efficiently perform their respective functions in accordance with the design.

C. To service completely the systems for a period of one (1) year.

This work shall include: Adjustment of belts and drives, care of cooling towers (where applicable), complete oiling and greasing of mechanical equipment and labor for changing of air filters. Replacement filters will be furnished by the Owner. Contractor is responsible for providing and changing filters with the frequency as deemed necessary by the engineer and/or commissioning agent during the building construction. All HVAC units that are operated during construction shall have MERV 8 Minimum construction filters. Final Operating filters shall be MERV 8 minimum. Additionally, contractor shall protect all ductwork and mechanical equipment openings with construction quality sheet plastic to prevent construction dust/debris from entering into air or water moving equipment. All equipment, pipe, ductwork or related appurtenances fouled by construction debris shall be removed and replaced. Ventilation air units shall not be used to dehumidify the building during construction activities. VAU's shall only be operated after final cleaning of the building.

END OF SECTION 15040

SECTION 15050 – BASIC MATERIALS AND METHODS

PART ONE – GENERAL:

1.01 APPROVALS AND SUBSTITUTIONS:

A. All requests for substitutions shall be submitted so as to be received by the Engineer at least ten (10) days before bid date and must be approved before award of contract.

B. Contract prices shall be based on material and equipment as specified, unless written approval is obtained for any deviations. Requests for substitutions before bid date may be submitted by Contractors or by Equipment Manufacturer's Representatives.

C. Requests for approvals shall be submitted in the form of a letter (with one [1] copy minimum) on a letterhead of submitting firm, along with a self-addressed stamped return envelope. Letter shall be addressed to the Engineer and referenced to this project. Faxed requests are not acceptable.

D. If there are no deviations between the items submitted and the plans and specifications then the submittal letter should contain the statement, "Items are in accordance with plans and specifications with no deviations." An item with deviations from the plans and specifications may be submitted for approval consideration. Letter should then state, "Item submitted is in accordance with plans and specifications, except for the following deviations." Deviations should then be listed in itemized form.

E. Items approved shall not be construed as authorizing deviations from the plans and specifications. Contractor shall be responsible for verifying all dimensions with available space conditions with provisions for proper access, maintenance and part replacement and for coordination with other trades – electrical, plumbing, structural, etc. for proper services and construction requirements.

F. Where such approved deviations require a different quality and arrangement of ductwork, piping, wiring, conduit and equipment from that specified of indicated on the drawings, the Subcontractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit and any other additional equipment required by the system at no additional cost to the Owner.

PART TWO – PRODUCTS AND EXECUTION:

2.01 MANUFACTURER'S INSTRUCTIONS:

A. Prior to purchasing equipment, procure product manufacturer's application, installation and operating instructions for use in conjunction with the system design drawings and specifications during construction. If there is any conflict between the manufacturer's publications and the design drawings and specifications, immediately notify the Engineer in writing. Upon notification by the Engineer, proceed in accordance with his/her instructions.

2.02 SHOP DRAWINGS:

A. The Subcontractor shall submit for approval detailed shop drawings of all equipment and all material required to complete the project and no material or equipment may be delivered to the job site or installed until the Subcontractor has in his possession the approved shop drawings for the particular material or equipment. The shop drawings shall be complete as described herein. The Subcontractor shall furnish the number of copies required by the General Contractor and Special Conditions of the contract but in no case less than six (6) copies. Shop drawings shall be submitted in appropriately sized 3-ring binders. Submittals shall be comprehensive and include all equipment/products to be provided. Partial submittals will be disapproved.

B. Prior to delivery of any material to the job site and sufficiently in advance of requirements to allow Architect ample time for checking, submit for approval detailed dimensional drawings or cuts showing construction, size, arrangement, operating clearances, performance characteristics and capacity. Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equal quality, finish and durability to that specified.

C. Samples, drawings, specifications and/or catalogs submitted for approval shall be properly labeled indicating specific service for which material or equipment is to be used, section and article number of specifications governing, Contractor's name and name of project.

D. Catalogs, pamphlets or other documents submitted to describe items on which approval is being requested shall be specific and identification in catalog, pamphlet, etc. of each item submitted shall be clearly made in ink. Data of a general nature will not be accepted.

E. Approval by the Architect and/or Engineer of shop drawings for any material, apparatus, devices and layouts shall not relieve this Contractor from the responsibility of furnishing same of proper dimension, size, quantity, quality and all performance characteristics to efficiently perform the requirements and intent of the contract documents.

In addition, approval shall not relieve this Contractor from responsibility for errors of any sort on the shop drawings. If the shop drawings deviate from the contract documents, this Contractor shall advise the Architect and/or Engineer of the deviations in writing accompanying the shop drawings, including the reasons for deviations.

F. Failure of the Subcontractor to submit shop drawings in ample time for checking shall not entitle him/her to an extension on contract time and no claim for extension by reason of such default will be allowed.

END OF SECTION 15050

SECTION 15404-FLOOR DRAINS, CLEANOUTS, FLASHING & SLEEVES

PART ONE – GENERAL:

1.01 PIPE CLEANOUTS:

A. Install cleanouts at the base of each stack, not over 50 feet in horizontal 3" inch lines, at 75 feet in 4-inch lines, at turns greater than 45 degrees, and where shown. This applies outside as well as in the building. Extend outside cleanouts to surface. See detail on drawings for pad. All threaded parts of the assembly shall be metal.

B. Cleanouts, in general, to be pipe size up to 4 inches; not less than 4 inches for larger pipes. Cleanouts to be heavy brass ferrules and heavy brass plug with raised nut. Except as specified, cleanouts in walls or floors on grade to be extended flush and fitted with heavy polished brass plug with recessed socket. Cleanouts are listed in Schedule on plans. Products shall be by Zurn, Josam, Wade, or Smith.

C. Cleanouts shall be lead caulked into cast iron soil pipe to provide rigid joints. Extend lead joints past first horizontal fitting. In the event underground piping is specified or value engineering to be PVC, connect to the cast iron with a “double hub” section of pipe with lead and oakum joints. This applies inside as well as outside building. Any "loose" cleanouts or pads shall be reworked. Do not install no-hub band below grade to attach cleanout.

D. All interior cleanouts shall be provided with "vandal-proof" screws. At completion of project, furnish to Owner one "tool" to operate each size screw on project.

E. All cleanouts installed in an area to receive Dex-O-Tex flooring shall have an integral wide flange. See Architectural Finish Schedule.

1.02 FLASHING:

A. Where pipes pass through roof, flash as recommended by the manufacturer of the roofing system. Metal roofs shall have Dektite Model #1 or #3 enclosing the pipe and extending 8" in all directions. Equal flashing assembly shall be by Custom Curb or Portals Plus, Inc. Built up or shingle roofs shall have 4 pound lead boot flashings. Turn lead down into the vent pipe. Furnish lead flashing as specified on plans. Deliver to Roofer for installation prior to start of roofing work.

B. Vent pipes shall extend a minimum of 12" above roof.

C. Provide support for vent stacks at roof with U bolts and uni-strut or angle installed between roof purlins, truss, or bar joist.

1.03 FLOOR DRAINS:

A. Unless indicated otherwise, floor drains shall be three-inch minimum size and shall be cast iron with Nikaloy brass suitable strainer. Furnish clamping collars where membranes are used - otherwise all drains shall have integral seepage pan. Drains are scheduled on plans. All threaded parts of the assembly shall be metal. All drains shall be furnished with caulk outlets. Products shall be by Zurn, Josam, Wade, or Smith.

B. Drains shall be provided with cast iron deep seal P-traps. All drain, trap outlets, and piping to connection into trunk line shall be lead caulked into cast iron soil pipe for rigidity. In the event underground piping is specified or value engineered to be PVC, connect to the cast iron with a “double hub” section of pipe with lead and oakum joints. Any "drains" found to be "loose" shall be reworked prior to pouring floor.

C. Do not block-out for drains; pour into floor slab. Recess drains in large areas 3/4" below finish floor. Floor slope by General Contractor. Drains in small areas or under servicing counters, or equipment shall be flush with finish floor.

D. Do not use no-hub bands to install any floor drain that is in the ground floor slab.

E. Drains shall be equipped with "vandal-proof" screws in strainer tops. Provide Owner with "tool" for each size screw at completion of job.

F. Drains located in areas with Dex-O-Tex floor finish shall have wide flange cast integrally with drain body or a steel plate welded to drain body. Drains with a sheet metal flange are not acceptable.

G. See Note #9 for drains that required trap primer (1/2") connections. All trap primers shall be by drainage connection, no connection to the domestic water piping. Do not install any device above ceiling for this purpose.

1.04 PIPE SLEEVES AND ESCUTCHEONS:

A. Where pipes pass through masonry construction, install sleeves sized to allow 1/2 inch clearance entirely around the passing pipe and insulation. Install sleeves during construction of walls, ceilings, and floors. Extend vertical sleeves a minimum of one inch above finished floor. Install sleeves in a water proof manner. Caulk with packing and waterproof plastic compound. Sleeves in bearing walls and floors shall be made of Schedule 40 steel pipe. Sleeves on other masonry walls shall be made of steel pipe or sections of cast iron pipe. Sleeves shall be flush with each side of masonry wall.

B. Install chromium plated steel escutcheons where pipes and conduit pass through finished walls and ceilings. Install chromium plated cast brass escutcheons where pipes and conduits pass through finished floors.

C. See details for fireproofing of pipes through sleeves in firewalls and floors. Extend

insulation on all pipes through fire walls or floors. Contractor shall use a "UL" assembly without substitution. See hourly rating noted on each sheet of plans to identify firewalls.

D. All copper lines shall be sleeved where whey pass through concrete or block.

1.05 FIXTURE CARRIERS

A. Wall hung fixtures shall be supported on wall plate hangers with rectangular steel tube legs bolted to the floor slab. Use of pipe supports is not allowed.

B. Carriers shall be manufactured by Smith, Wade, Zurn, Josam, Watts or MIFAB.

1.06 TRAP PRIMERS

A. Floor Drains noted to have trap primer connection shall have ½" IPS threaded connection. Route ½" soft copper from floor drain up in wall at fixture indicated. Cover copper piping below slab and in block with slip on vinyl jacket.

B. Trap primer shall connect to P-trap of fixture. See note 9 on plans. Do not connect to water lines.

C. Trap primer shall be model #2698 1 1/2" Chrome by J.R. Smith or equals by Zurn.

D. Primer tube shall be ½" chrome plated copper with compression fitting or stainless steel flex hose of the exact length to go from trap to wall without undue sag.

END OF SECTION 15404

MECHANICAL AND ROOFING RENOVATIONS TO ST. JAMES MIDDLE SCHOOL

SECTION 15406-HANGERS, SUPPORTS AND FIRE STOPPING

PART ONE – GENERAL:

1.01 PIPE SUPPORTS:

A. Perforated strap hangers, chains, or wire will not be permitted on the job.

B. Support horizontal ferrous piping where run above ground with galvanized split ring hangers, turnbuckles and threaded rods, as manufactured by Grinnell Co., PHD Manufacturing, Michigan Hanger Co., or B-Line Systems. Hangers to be securely fastened to structure and spaced not over 5 feet apart for cast iron pipes and 8 feet apart for other ferrous pipes. Locate hangers as close to hubs or bands as possible. Hangers shall be equal to Michigan Hanger Co. #401.

C. Support horizontal copper piping where run above ground and all insulated pipe by means of oversize hangers with integral factory installed insulation shields. Hangers shall be spaced not over 6 feet apart for 1-1/2" and smaller pipes, and not over 8 feet apart for 2" and larger pipes. Insulation shall be continuous through the hangers. Hangers shall be equal to M-Co. #403 or PHD #455.

D. Support horizontal “plastic” acid waste piping by means of PHD #450 V clevis hanger and #450T support trough. Provide hangers on each side of trough joints, 10' length.

E. Furnish and install intermediate or supplementary steel required for proper support of piping and installation of hangers. Group parallel runs of pipe and support by common angle hangers of adequate dimensions.

F. Where pipe smaller than 1" is installed along the face of the wall, install Grinnell #153 hanger flange and CT-138R split-ring tubing hanger. Bolt to wall with lag screws, or toggle bolts. Contractor shall cut and seal pipe insulation around each hanger.

G. Where indicated and detailed on plans, support all domestic water lines in corridors on galvanized angle iron frames. Frames shall be bolted to block walls or through bolted to metal studs with oversized fender washers. Detail indicates the maximum size required. Submit shop drawing from a Registered Seismic Engineer for each condition for any condition of lesser number of lines, smaller diameter pipes, smaller angle or thinner angle iron. Frames shall be welded, drilled, cleaned and then hot dipped galvanized.

H. Provide seismic cable braces on drain, waste, vent, water, gas, and or specialty piping as noted on detail.

I. See details for fireproofing of pipes and pipe sleeves in firewalls and floors. Extend insulation on all pipes through pipe sleeve in firewalls or floors. Contractor shall use an “UL” assembly without substitution. See hourly rating noted on each plan to identify

firewalls. All pipe penetrations of fire rated walls or floors (except coredrilled floors) shall have a schedule 40 steel sleeve.

END OF SECTION 15406

SECTION 15416 – NATURAL GAS PIPING

1.01 GAS SYSTEM:

A. Provide a system of gas piping including connection to the service. See notes and detail on plans. Regulators, and piping shall be by this Contractor.

B. Connect to each gas consuming appliance and outlet. Install gas cock and union ahead of each connection. All work and materials shall meet local requirements and comply with the International Gas Code. Contractor shall provide letter of certification to the Engineer that gas system has been installed and tested per the Gas Code.

C. Interior above grade pipe 2 ½" and smaller shall be Type A53 Schedule 40 black steel with screwed malleable iron fittings. Exterior above grade piping 2 ½" and smaller shall be Type A53 Schedule 40 galvanized steel with screwed malleable iron fittings. Gas piping 3" and larger shall be welded Type A53 Schedule 40 with welded fittings. Pipe shall be either black steel or galvanized as specified previously for threaded pipe. Weld joints and fittings on galvanized pipe shall be cold galvanized after fabrication. All gas piping and fittings shall be made in the USA.

D. All below grade gas piping shall be high density polyethylene (HDPE) piping. Piping shall be as manufactured Performance Pipe, DRISCOPIPE 8100 series, HDPE gas distribution pipe or prior approved equal HDPE product. All pipe and fittings shall be manufactured in accordance with ASTM D2513. Pipe and fitting shall be joined by heat fusion in accordance with the manufacturer's instructions.

E. Pipe below slab on grade shall be Schedule 40 black steel within conduit. Conduit shall be Schedule 40 galvanized steel. Conduit shall be connected together and sealed gas tight. See plans for gas vents, conduit details, and special notes. Conduit shall be sized to allow removal of gas piping with last elbow in place. No gas piping shall be installed in such a manner that it can not be removed for replacement.

F. Leak test all pipe before concealment and connection as required by local authority (or at 150 psig) and deliver certificate of approval, in triplicate, to Architect. Notify Engineer 24 hours prior to test so a Representative may be present during test.

G. Leak test completed system after installation of all fittings, valves, trim, etc., are in place and before any use by Owner. Test pressure shall be 4 psig and shall be scheduled so Owner, State Fire Marshall, Architect, and Engineer, as well as Contractor, may have a Representative present. Test shall be a minimum of 20 minutes.

H. Provide ten-foot ground rod at tank location. Bond gas line to ground rod and to main domestic cold-water line with bare #6 copper wire. Route wire through 1/2" EMT.

I. Tanks shall be ASME labeled, size as noted on plans, furnish and install as indicated. Bolt saddles to pad provided if above grade installation. Bury tank with hold down pad, straps, and special coating for underground installation. See plan for regulators. Install plug valve at each tank. See detail.

J. Plumbing Contractor shall include the cost of the fuel to fill each tank and arrange for filling at time of installation. Tanks shall be full at Substantial Completion of the project.

K. Valves:

1. Plug valves shall be bronze body and plug, threaded ends, and square head for 125-pound W.O.G. Valves shall be: Crane No. 250, Walworth No. 554.

2. Lubricated plug valves shall be factory lubricated and sealed and shall be rated for natural gas.

3. Provide one box end wrench to the Owner for each size and type of valve head.

4. Ball valves shall have bronze body, brass stem, chrome plated brass ball and reinforced teflon seat, threaded ends and rated 600-pound W.O.G. Valves shall be: Apollo 70-100.

L. Provide union, ball valve, and flex hose rated for natural gas at connection to each appliance or equipment. See notes on kitchen plan and equipment schedule.

M. Provide type “B” vents from gas heaters thru roof, see detail.

END OF SECTION 15416

SECTION 15425 – PIPE IDENTIFICATION

PART ONE – GENERAL:

1.01 IDENTIFICATION OF PIPING:

A. General:

1. The following piping system shall be provided with identification as hereinafter specified:

PIPING SYSTEM	MARKER BACKGROUND COLOR	MARKER LETTERS
Domestic Cold Water Supply	Green	White
Domestic Hot Water Supply	Yellow	Black
Domestic Hot Water Circulation	Yellow	Black
Gas Piping	Yellow	Black

B. The legend and letter colors for the pipe marking system shall be in accordance with applicable provisions of ANSI Standard A13.1-1981.

C. Shop drawings submitted to the Architect/Engineer shall show complete details of the marking system, including colors and legends.

D. Marking System:

1. All piping that is accessible for maintenance operations (except piping in finished spaces) will be identified with semi-rigid plastic (not pressure-sensitive) identification markers.

2. Direction of flow arrows are to be included on each marker unless otherwise specified.

3. In conformance with "Scheme for the Identification of Piping System" (ANSI A13.1-1981), each marker must show:

a. Approved color coded background.
b. Proper color of legend in relation to background color.
c. Approved legend letter size.
d. Approved marker length.

4. Locations for pipe markers shall be as follows:

a. Adjust to each valve and fitting (except on plumbing fixtures and equipment).
b. At each pipe passage through wall, floor, and ceiling construction.
c. At each passage to underground.
d. On all horizontal pipe runs - marked every 25 feet.

5. Pipe marking shall be as follows:

a. SETMARK Type SNA markers on pipes 3/4" thru 5" (Snap On).
b. SETMARK Type STR markers on pipes 6" and larger (Snap On).
c. Pipe identification system shall be SETMARK outdoor grade plastic acrylic.
d. Pipe markers as manufactured by Seton Nameplate Co., New Haven, CT 06506 (1-800-243-6624) or approved equal. Equal products by Brady Corp. (1-800-635-7557).

6. For pipes under 3/4" O.D. (too small for color bands and legends), brass identification tags 1 1/2" in diameter with depressed 1/3" high black-filled letters above 1/2" black-filled numbers will be fastened securely at specified locations.

END OF SECTION 15425

SECTION 15748 – PACKAGED VENTILATION AIR DEHUMIDIFICATION UNITS

PART ONE – GENERAL:

1.01 Units shall be self contained, split or packaged as indicated, consisting of filters, evaporators, fans and motors, heat exchangers, outside air intake, cooling coil, condensate collector and drain, compressor, condenser fan and motor, total energy wheel, hot gas reheat coil, interconnecting refrigerant piping and factory installed control end devices wired to a terminal strip with no controller and no interface. Units must be capable of providing first source sensible cooling. The units shall be designed in accordance with UL requirements and be A.R.I rated.

1.02 Units shall be ETL/UL listed and meet all applicable requirements of ASHRAE 90.1 – AHRI-920, with respect to performance operating points with no interruption in dew point/reheat delivery. All points in AHRI-920 must be achieved at all times.

1.03 Provide Manufacturer's 5 Year Parts & Labor Warranty for whole unit.

1.04 Units shall be as manufactured by Trane Model KCC or equal by Greenheck-Model RVE as alternate bid. See bid form.

PART TWO – PRODUCTS:

2.01 BASE FRAME:

A. Cabinet Base Rails: Side and end base rails shall include openings for forklift and tie-down access. To protect unit base from fork damage side rails shall include removable heavy gauge fork pockets.

2.02 UNIT CASING:

A. Unit shall be built for outdoor use with cabinet panels constructed of 2" double-wall foamed panel construction throughout the indoor section of unit to provide nonporous, cleanable interior coated galvanized steel surfaces. All interior seams exposed to airflow shall be sealed. Insulation shall be 2" polyisocyanurate foam metal encapsulated with no exposed edges. Initial R value of 6.6 per inch of thickness.

B. Cabinet construction shall provide double wall hinged access doors providing easy access for all parts requiring routine service. Water and Air Tight Hinged Access Doors shall provide access to air filters, heating section, electrical and control cabinet sections, ERV and 100% power exhaust fan section, supply air fan section, evaporator and reheat coil sections. Insulated doors shall be constructed to allow the hinges to be reversed in the field. Hold-open device shall be factory installed on all hinged access doors. Chains shall not be used as hold-open devices. Fans and energy recovery components shall be mounted on slide racks for ease of maintenance.

C. Drain Pan material shall be Type 430 Stainless steel drain and constructed to sloped in two directions to ensure positive drainage with corners exposed to standing water and drain fittings welded liquid tight to prevent leaks. Pan shall have a minimum depth of 2". Base of drain pan shall be insulated with 1" thick foam insulation.

D. Cabinet top cover shall be one-piece construction or where seams exist, it shall be double-hemmed and gasket-sealed.

E. Interior Corrosion Protection: Interior surfaces shall be a stainless steel. Cabinet shall include interior liner constructed of 304 stainless steel seams. All unit coils shall be coated-see coating requirements below in specification.

F. Exterior Corrosion Protection: Exterior cabinet panels shall be a base coat of G-90 galvanized steel with exterior surfaces cleaned, phosphatized and finished with a weather-resistant baked enamel finish. Unit's surface shall be in compliance with ASTM B45 salt spray testing at a minimum of 672-hour duration.

2.03 HEAT EXCHANGER – ENERGY RECOVERY SECTIONS

A. The rotor media shall be made of aluminum, formed into a honeycomb structure to prevent corrosion, minimize pressure loss, avoid plugging, and to maintain wheel performance through the expected life of the unit. Paper, Plastic, Mylar, Air-Exchange wheels, or fibrous media are not acceptable. The rotor media must be coated to resist corrosion. All surfaces must be coated with a non-migrating desiccant layer to ensure that adequate latent capacity is provided. The desiccant coating must be firmly bonded to the aluminum surface and will not be dislodged when challenged with high velocity air up to 5000 feet per minute. Products that lose desiccant when served with high velocity air are not acceptable. The cassette must be a slide out design for serviceability. The media shall be cleanable with low temperature steam, hot water or light detergent without degrading the latent recovery.

B. Sensible and latent recovery efficiencies must be clearly documented through a testing program conducted in accordance with ASHRAE Standard 84 and AHRI 1060. The testing must have been conducted by a qualified independent organization. The performance test reports must be provided for engineering review as part of the submittals for this project. The rotor design shall ensure laminar airflow to minimize parasitic pressure loss and to optimize the operating efficiency of the system fans. The pressure loss across the media shall be no greater than the scheduled pressure loss values.

C. The rotor media shall be permanent, with an anticipated life of 20 years. It must be tested in accordance with ASTM Standard E-84 and provide smoke and flame spread ratings of less than 25 and 50 as required by NFPA 90A

and UL 1995. A copy of the ASTM E-84 test report confirming the method of test and results shall be provided with the submittal. Heat recovery wheels incorporating “throw-away” media and tested to UL900 for Class 2 filters are not acceptable.

D. The rotor shall be supplied with perimeter brush seals and face contact seals to minimize air leakage and wheel bypass. The rotor media shall be supported by a structural aluminum hub and aluminum reinforcing spoke system. The rotor bearings must be greaseable and provide L10 life in excess of 20 years.

E. The cassette framework shall be made of galvanized steel to prevent corrosion. The rotor must be driven by long-life polyurethane/polyester composite link belt system. The rotor/cassette shall be designed so that belt can be removed or serviced without the removal of the bearing. A 3 phase A/C gear motor shall be utilized to accommodate variable speed applications.

2.04 FAN SECTIONS:

A. The supply and exhaust fans shall be centrifugal plenum type heavy duty Class I or II with non-overloading backward inclined or airfoil wheels, AMCA certified. Supply and Exhaust Fans shall be high efficiency backward curved impeller. Fan wheel shall be statically and dynamically balanced. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil. Bearings shall be heavy duty grease lubricated self-aligning ball or roller pillow block type.

B. Supply and Exhaust Fans shall be provided with factory mounted and wired variable frequency drives and Supply and Exhaust Fans shall be provided with integral Piezometer Flow Rings for Air Flow Measurement.

C. Condenser fans shall be direct drive with premium efficiency motors, statically and dynamically balanced, draw through in the vertical discharge position. Shall be direct drive vertical discharge design with low-noise corrosion resistant glass reinforced polypropylene props, powder coated wire discharge guards and electro-plated motor mounting brackets. Provide condenser fans with integral, factory mounted variable frequency drives (VFDs) for modulating head pressure control.

2.05 MOTORS & DRIVES:

A. Fan, motor and belt drive shall all be mounted on a spring isolated chassis (minimum isolation efficiency 90-95%). Belt drives shall have a minimum service factor of 1.5. Motor electrical connections are to be factory pre-wired to the unit control panel.

2.06 DAMPERS:

A. General: All dampers shall be of low leakage type with blade edge and side seals. Dampers shall be constructed of galvanized steel (14-gauge frames/16-gauge blades) with self-lubricating porous bronze bearings.

B. Outside & Exhaust Air Shut-Off Dampers: Parallel blade dampers with electric modulating operators shall be provided to prevent infiltration of unconditioned air into the building when unit is not in operation.

C. Recirculation Air Damper: Parallel blade damper with electric two (2) position actuator shall be provided to allow for space dehumidification when in the unoccupied mode without the introduction of outside air.

2.07 EVAPORATOR, CONDENSER, HGRH COILS:

A. Cooling/dehumidification coils, Condenser coils, Hot gas reheat coils shall be constructed with copper tubes mechanically bonded to configured aluminum plate fins with performance certified by A.R.I. standards. Coils shall be factory leak tested in accordance ANSI/ASHRAE 15-1992 at a minimum pressure of 500 PSIG.

B. Evaporator coil shall include six rows of cooling interlaced for superior sensible and latent cooling with a maximum of 12 FPI for ease of cleaning.

C. The condenser coil shall have a fin designed for ease of cleaning.

D. Reheat coil shall be fully integrated into the supply airstream and be capable of delivering design supply air temperature. To prevent re-hydration of condensate from evaporator coil, the evaporator coil face and the hot gas reheat coil face shall be separated by a minimum of six inches.

E. Coil Coating for condenser, evaporator, Hot Gas Reheat Coils: All coils shall have a factory applied flexible epoxy polymer e-coat uniformly applied to all coil surface areas with no material bridging between fins. The coating process will ensure complete coil and coil casing encapsulation and a uniform dry film thickness of 1.2 mills on all surface areas including fin edges and meet 5b rating cross hatched adhesion per ASTM B3359- 93. Corrosion durability will be confirmed through testing with no less than 6,000 hours salt spray resistance per ASTM B117-90 using scribed aluminum test school coupons. Field coatings and spray coatings are not acceptable.

2.08 FILTERS:

A. The supply and exhaust air filters shall be 2” deep MERV 8 pleated cartridge type as standard, provided an average efficiency of 25-30% by ASHRAE Standard 52-76 test method. In addition, provide 4” deep MERV 13 pleated filters. Filters shall be Farr or equal. Face velocity through the filters shall not exceed 500 FPM at the unit’s rated nominal capacity.

2.09 HEATING:

A. Modulating Indirect Gas Fired Heating System: Completely assembled and factory installed heating system shall be located in the primary heating position located downstream of the indoor fan assembly and be integral to unit and approved for use downstream from refrigerant cooling coils in units mounted outdoors. Threaded gas connection shall terminate at manual shut-off valve. Provide capability for sidewall or thru-base gas piping.
B. Heaters shall include high turn-down burners firing into individual stainless-steel tubular heat exchangers. Heat exchangers shall be constructed of type 439 stainless steel and be a high efficiency dimpled tubular design capable of draining internal condensate. Units with multiple heaters shall include one fully modulating high turndown heater with additional on-off heater sections. Total heater turndown shall be of 20:1.
C. Heater outdoor air inlet shall be hooded and include internal baffle system to prevent rain blow thru. To prevent recirculation of flue gas and to prevent flue gas condensate from draining onto and obstructing the heater air inlet the inlet shall be hooded and shall be located a minimum of 11” beneath the flue outlet. Inlet hood shall include bird screen.
D. Heater flue outlet(s) shall include hooded outlet with wire cloth all constructed of Type 430 stainless steel. Hooded outlet shall be sealed to prevent flue gas recirculation.
E. Gas Burner Safety Controls: Provide safety controls for the proving of combustion air prior to ignition, continuous air proving monitoring following ignition and continuous electronic flame supervision.
F. Unit controls shall monitor heat output and shall discontinue all heating attempts and or unit operation in the event the heating section fails to ignite or fails to maintain programmed supply air temperature/time.
G. Inducer fan shall be direct drive high pressure centrifugal type with two speeds and shall include built- in thermal overload protection.
H. Limit controls: High temperature automatic reset limits shall be located on blower wall and in indoor fan chamber to shut off gas flow in the event of excessive temperatures resulting from restricted indoor airflow, or loss of indoor airflow.
I. Flame roll-out safeties shall provide continuous monitoring of proper burner operation.

2.10 ELECTRICAL:

A. Control panel(s) shall be provided with hinged access doors and an approved locking device in a NEMA 3R enclosure. All high voltage power components such as fuses, switches and contactors shall include a service personnel protection barrier or shall be a listed as touch-safe design. Field wiring access to be provided thru unit base into isolated enclosure with removable cover.

1. Power wiring to be single point connection.

2. Wiring internal to the unit shall be colored and numbered for identification.

3. Unit shall be factory wired to field wiring terminal block mounted in isolated enclosure.

4. Factory wired main non-fused power disconnect and overcurrent device shall be rated for total unit connected power

5. SCCR rating shall be a minimum of 65kA

6. Factory wired Voltage/Phase monitor shall be included as standard. In the event of any of the following, the units will be shut down and a fault code will be stored in the monitor for the most recent 25 faults. Upon correction of the fault condition the unit will reset and restart automatically.

a. Phase Unbalance Protection: Factory set 2%
b. Over/Under/Brown Out Voltage Protection: +/-10% of nameplate voltage
c. Phase Loss/Reversal
d. Single Phase Protection

A. Factory to mount and wire 120-volt convenience outlet. Field wiring of convenience outlet not acceptable.

B. All low voltage field wiring connections shall be made at factory installed low voltage terminal strip.

2.11 COMPRESSORS AND AIR-COOLED CONDENSING UNIT:

A. Unit shall be provided complete with an air-cooled condensing unit of the size and capacity as indicated on the equipment schedule. Provide each unit with two hermetically sealed independent refrigerant circuits factory-supplied completely piped with liquid line filter-drier, liquid line charging port, suction and liquid line pressure ports, sight glass, and thermal expansion valve, suction line accumulator, and charge compensator

B. ACCU shall have a minimum of two (2) independent refrigerant circuits, a minimum of 2 modulating digital scroll compressors-one for each circuit- to provide infinite modulating capacity between 5% and 100% of capacity for each circuit. Hot gas bypass is not permitted.

C. Condensing Unit/Compressors must be able to provide mechanical cooling down to 55 F ambient while maintaining DX Cooling Coil Leaving Air Dew Point at a constant 48 F, and, be able to provide 20-degree temp rise with full hot gas reheat capacity.

D. Each compressor shall have a crankcase heater to minimize the amount of liquid refrigerant present in the oil sump during off cycles. Each compressor shall be mounted on rubber vibration isolators, to reduce the transmission of noise.

E. Unit shall be capable of providing design supply air conditions (leaving air - dry bulb and wet bulb) during part load operation. Part Load Design point shall be demonstrated at engineer's request; 68F db / 64.3F wb ambient conditions, unit shall deliver supply air design conditions (leaving air - dry bulb and wet bulb), while maintaining 70 reheat.

F. Provide each circuit with automatic reset high and low pressure and high temperature switches for safety control.

G. Condenser coil hail guards shall be factory installed.

2.12 UNIT CONTROLS:

A. Main Unit Controller (MCM) shall be provided by CMI. (There shall be no control interface devices, no integration, no BacNet, and no controllers provided by the VAU manufacturer.) VAU manufacturer shall provide and factory install the following control end devices and wire all to a terminal strip, with no controller and no interface:

1) Outdoor Air Temperature Sensor
2) Outdoor Air Humidity Sensor
3) Outdoor Air Flow Measuring Station
4) Outdoor Air Modulating Damper and Actuator
5) Outdoor Air Total Energy Wheel Modulating Bypass Damper and Actuator
6) Exhaust Air Total Energy Wheel Modulating Bypass Damper and Actuator
7) Total Energy Wheel Rotation Sensor
8) Total Energy Wheel Enable
9) Return Air/Mixed Air Modulating Damper and Actuator
10) Return Air Temperature Sensor
11) Return Air Humidity Sensor
12) Return Air Duct Pressure Sensor
13) Filter Differential Pressure Switch – Status
14) Exhaust Fan Piezometer Air Flow Station
15) Exhaust Fan ECM Variable Speed Fan Control
16) Exhaust Damper and Actuator
17) Exhaust Damper End Switch
18) Exhaust Air Temperature Sensor
19) 0-10 vDc Input for Single/Dual Digital Compressor Capacity Modulation
20) Evaporator Leaving Air Temperature Sensor
21) 0-10 vDc Input for Hot Gas Reheat Modulation
22) Supply Fan Status
23) Supply Fan Piezometer Air Flow Measuring Station
24) Supply Fan ECM Variable Speed Fan Control
25) Modulating Gas Heat
26) Unit Leaving Air Temperature Sensor for Discharge Air Temperature.

PART THREE – EXECUTION:

3.01 Unit shall be provided with factory start-up and check-out by manufacturer's personnel, no exceptions. Provide written report by manufacturer documenting start-up to Engineer for approval. Inspections and 5-year parts and labor warranty work shall be performed by manufacturer's personnel, no exceptions. Manufacturer shall employ a minimum of 10 certified technicians, within 25 miles of job site, qualified to work on equipment.

3.02 Mount unit on structural aluminum or hot dipped galvanized seismic roof curb per Section 15890 with flashing assembly that complies with the National Roofing Contractors Association requirements. The roof curb on the top elevation must be true and level. Contractor shall provide supplemental steel to attach curb to structure as recommended by Curb Manufacturer. See Specification Section 15890 for product and design criteria.

3.03 Provide type "L" hard copper P-trap assembly at each condensate drain connection with threaded cleanout plug full size of unit connection a 1" minimum. Depth of trap shall be sufficient for drainage with static pressure of unit.

3.04 Insulation shall be provided on refrigerant section and condensate piping. Insulation shall be ¾" thick "Rubatex" or "Armaflex." Seal all joints with adhesive. Insulation shall not be cut lengthwise to install. All exterior refrigerant piping shall be covered with 22-gauge aluminum or 24-gauge stainless steel jackets. Provide 1" thick "Rubatex" or "Armaflex" on refrigerant suction piping 1 ½" O.D. and larger.

3.05 All piping shall be hung with clevis type hangers complete with insulation saddles. Route liquid line above suction and tie wrap 4' o.c. with 3/8" wide nylon straps without compressing insulation. Pipe hangers shall be as manufactured by Michigan Hanger Co., Grinnell or B-Line. Hangers equal to M-CO #403.

END OF SECTION 15748

SECTION 15808 – DUCTWORK

PART ONE – GENERAL:

1.01 Ductwork, including exhaust, shall conform to all applicable requirements of the latest issue of NFPA Pamphlet No. 90A. All ductwork, elbows, take-offs, transitions and etc. shall conform to the recommendations of SMACNA duct construction standards as a minimum requirement, unless otherwise indicated by the contract documents.

1.02 Ductwork shall be installed to operate without noise or vibration and shall be air tight. The Contractor shall be responsible for measuring at the building all conditions, space available, piping, light fixtures, ceiling heights, etc. that affect ductwork installation prior to fabrication. Ductwork shall be constructed as job progresses, not in advance.

PART TWO – PRODUCTS:

2.01 LOW PRESSURE DUCTWORK:

A. Low pressure and exhaust ductwork shall be galvanized sheet steel constructed to the requirement of SMACNA Table 1-5 for 2" W.G. static pressure, unless otherwise noted. Duct and fitting sealing requirements shall be in accordance with SMACNA Table 1-2, Seal Class "A". Duct tape is not allowed. Seismic restraints shall be provided for all ducts with a cross sectional area of six (6) square feet and larger in accordance with the International Building Code, International Mechanical Code and SMACNA Seismic Restraint Manual, Latest Edition. Gauges and reinforcing shall be as follows:

MAXIMUM SIDE INCHES	STEEL U.S. STANDARD GAUGE*	TYPE OF TRANSVERSE JOINT CONNECTIONS	BRACING
Up to 24	24	S, Drive, Pocket or Bar Slips, 7'-10" o.c.	None
25 to 30	24	S, Drive, Pocket or 1" Bar Slips, 7' – 10" o.c.	1" x 1" x 1/8" Angles 4' o.c.
31 to 40	22	Drive, 1" Pocket or 1" Bar Slips on Centers	1" x 1" x 1/8" Angles 4' o.c.
41 to 60	22	1 ½" Angle Connections, 1 ½" Pocket or 1 ½" Bar Slips with 1 3/8" x 1/8"	1 ½" x 1 ½" x 1/8" Angles 4' o.c.

		Bar reinforcing 7' 10 " o.c.	
61 to 90	20	1 ½" Angle Connections, 1 ½" Pocket or 1 ½" Bar Slips with 1 3/8" x 1/8" Bar reinforcing 7'10" o.c.	1 ½" x 1 ½" x 1/8" Angles 2' o.c.
91 and Up	18	2" Angle Connections, 1 ½" Pocket or 1 ½" Bar Slips with 1 3/8" x 1/8" Bar reinforcing 3'9" o.c.	1 ½" x 1 ½" x 1/8" Angles 2' o.c.

2.02 ROUND INSULATED FLEXIBLE DUCTS & SPIN-IN COLLARS:

A. Insulated flexible ducts shall consist of an inner core of acoustically transparent CPE inner film or perforated corrugated aluminum with sound attenuating features complete with a factory applied exterior jacket of R 4.5 fiberglass insulation and reinforced metalized vapor barrier with 0.05 ASTM E96 permeance rating. Duct shall be UL listed as Class 1 air duct, standard UL 181 with flame spread and smoke developed ratings of 25 and 50 respectively.
Minimum working pressure shall be 4" W.G. positive. Flexible ducts shall be:

(1) Flexmaster 1M – Acoustical Insulated
(2) Clevaflex – Clevaform DB-series-type DBA acoustical duct

B. Spin-in collars shall be constructed of galvanized steel with scoop and damper.

PART THREE – EXECUTION:

3.01 *Gauge Stamps: Turned out and on bottom of ducts.

3.02 All supply and return duct elbows with an inside radius of less than ¾ of duct width shall have single thickness turning vanes. All square elbows shall have double thickness turning vanes.

3.03 All exhaust duct elbows shall have not less than 6" inside radius. All square elbows shall have single thickness turning vanes.

3.04 Splitter dampers and branch take-off extractors shall be installed where indicated and shall be adjustable and shall have locking quadrants.

3.05 All branch take-offs shall be 45-degree entry type per SMACNA Fig. 2-6. No straight tap or butt fittings allowed.

3.06 Flexible duct connections shall be provided where ductwork connects to equipment and shall be Ventglas 30 oz. woven glass fabric double coated with neoprene, fire retardant, waterproof, air tight and UL listed.

3.07 Duct sizes indicated on plans are interior dimensions. Increase metal duct sizes as required for acoustical or interior insulation.

3.08 All ductwork shall be supported by 1" x 1/8" galvanized iron straps with a maximum spacing of 8'. Straps shall be bolted or clamped to the structure and be turned and fastened to bottom of the duct so that duct weight is not on the fastening screws.

3.09 Provide 1" diameter test slots with cover for insertion of thermostat or test instruments at all locations required to perform operations under paragraph "Balancing."

3.10 Provide duct access doors to afford easy access to entering air side of items requiring maintenance or inspection (such as thermostats, fire damper, etc.). Doors shall be of ample size for service required (18" x 12" minimum) and provided with frame, brass hinges, handle, clamping device and gasket for air tight joint.

3.11 Round flexible ducts shall be installed in extended condition free of sags and kinks using only the minimum length required to make the connection. Abrupt bends and turns that crimp the duct and restrict the air flow will not be permitted. Horizontal supports shall be ¾" wide 22-gauge flat galvanized steel sheet banding material. Flexible ducts shall be supported on 36" centers. Maximum allowable length of a flexible duct shall be 8'. If extended run-out is indicated, round galvanized steel shall be used for run-out length in excess of 8'.

3.12 The entire duct system shall be free from rattles. If rattles exist after ductwork has been installed, the labor and materials necessary to eliminate rattles shall be done at the expense of this Contractor.

3.13 All return duct connections to air devices shall be rectangular unless otherwise indicated on plans. Use of flexible duct is prohibited on any return or exhaust ductwork.

3.14 Where ceiling plenum returns are used, the return duct shall be fitted with a bell-mouth entry covered with 1" x 1" galvanized hardware cloth.

3.15 Kitchen hood exhaust ductwork systems shall be constructed to the requirements of NFPA 96. Ductwork shall be a minimum of 18-gauge 316 stainless steel with all seams and joints sealed liquid tight with a continuous external weld. Dishwasher hood exhaust shall be 16-gauge stainless steel.

3.16 Prior to substantial completion, Contractor shall retain an independent licensed and professional testing agency that specializes in indoor air quality that will test for excessive dust and/or debris that may be present in the duct system. If it is determined that cleaning of duct is necessary, the Contractor shall employ a qualified duct cleaning agency to perform the work at no additional cost to the Owner.

END OF SECTION 15808

SECTION 15820 – DAMPERS

PART ONE – GENERAL:

1.01 Mechanical Contractor shall furnish and install all dampers as indicated on drawings or called for under Specifications.

1.02 Dampers shall be as manufactured by Air Balance, Inc., Phillips-Aire, Ruskin Manufacturing Co. or Louvers and Dampers, Inc.

PART TWO – PRODUCTS:

2.01 MANUAL & AUTOMATIC DAMPERS:

A. Manual and automatic dampers shall be of the multi-louver opposed blade type equipped with an external operating shaft. Locking device shall be provided for manual dampers.

2.02 FIRE DAMPERS:

A. Fire dampers for low pressure and exhaust ductwork shall be parallel blade positive closure mounted in a galvanized steel channel frame. Dampers shall be curtain type meeting all UL 555 and NFPA requirements. Dampers shall be high free area style with blade package mounted out of air stream. Dampers in stainless steel ductwork shall be constructed of type 304 stainless steel. Fuse line shall be 160 degrees. Fire dampers shall have a UL label with a 1 ½ hour rating for use in partitions with ratings of up to two (2) hours. Fire dampers shall have a UL label with a three (3) hour rating for use in partitions with ratings of up to four (4) hours.

B. Fire dampers shall be provided as follows:

1. In all duct passages through fire rated assemblies.

2. In all duct passages through floor.

3. In fire rated openings used for return air passages.

4. See Architectural floor plans for locations and ratings of all fire rated assemblies.

C. Ceiling radiation dampers shall be installed at air device penetrations of a fire rated ceiling. Dampers shall be UL listed with 165 degrees F. fusible link. Phillips-Aire Series 8 (rectangular) or 9 (round) dampers or approved equal.

2.03 SMOKE DAMPERS:

A. Smoke dampers shall be classified by Underwriters Laboratories as Leakage Rated Dampers for Use in Smoke Control Systems under the latest version of

UL Standard 555S and shall bear a UL label. Smoke dampers and their operators shall be qualified under UL 555S to a minimum elevated temperature of 250 degrees F. Dampers shall be qualified at UL 555S Leakage Class II. Combination dampers shall comply with both UL 555 and UL 555S.

B. Electric operators shall be installed by the damper manufacturer at time of damper fabrication. Installation of damper with operator and smoke detectors shall be coordinated with Controls Contractor to provide a complete and operational smoke damper in accordance with NFPA 90A.

C. Provide smoke dampers and smoke detectors at each duct penetration of a smoke wall. Refer to Architectural plan for locations of all smoke walls. Refer to control sections of Specifications for smoke detector hardware requirements. Detectors shall meet requirements of NFPA 72.

PART THREE – EXECUTION:

3.01 Fire and smoke dampers shall be provided with access doors to operate and reset. Provide identification markers with lettering a minimum of ½" high on each access door stating "fire damper" or "smoke damper" as applicable per requirements of I.B.C. 715.4 and I.M.C. 607.4. Areas around dampers shall be fire stopped with fire resistant materials consistent with UL tested assembly requirements.

3.02 Where fire and smoke dampers are located above a hard or security ceiling, Contractor shall provide access doors in ceiling to reach dampers. Coordinate door and frame style with Architectural Finish Schedule. Submit to Architect for approval.

END OF SECTION 15820

SECTION 15850 - INSULATION

PART ONE - GENERAL:

1.01 All insulation shall have a composite fire and smoke hazard rating which shall include insulation, jacket, facing, and adhesive. Flame spread rate shall not exceed 25 with smoke development not in excess of 50. Accessories (adhesives, mastics, cements, tapes) shall be rated as specified for insulation. Samples of all types of insulation shall be submitted for approval. Piping and duct work shall be tested, thoroughly cleaned and approved before insulation is applied.

PART TWO - PRODUCTS:

2.01 Insulation shall be as manufactured by Manville, Certain-Teed, Owens-Corning, Knauf, or approved substitute.

PART THREE - EXECUTION:

3.01 SUPPLY, RETURN, AND OUTSIDE AIR DUCTWORK:

A. All concealed ductwork, including flexible duct connections, diffuser boots, and backs, VAV box heater/manifold sections, etc. shall be insulated with 2" thick, 1 pcF density, flexible insulation with factory applied vapor barrier consisting of Foil-Scrim-Kraft. Insulation shall be secured to ductwork with Benjamin Foster 85-20 adhesive. All joints shall be stapled and finished with a 3" wide strip of glass fabric and mastic.

B. All exposed ductwork shall be insulated internally with 1” Armaflex type SA insulation secured with weld pins. Ductwork in mechanical rooms is considered concealed.

C. All transfer air ducts shall be insulated internally as described for exposed ductwork above.

3.02 DUCTWORK SERVING VENTILATION AIR UNITS:

A. All supply and return/exhaust air ductwork serving ventilation air units shall be externally insulated with 2” Armaflex type SA sheet elastomeric insulation secured with weld pins. Exterior ductwork shall be covered with 26 GA stainless steel jacketing and flashed to the exterior wall of the building weathertight.

END OF SECTION 15850

SECTION 15890 - VIBRATION AND SEISMIC CONTROL

PART ONE - GENERAL:

1.01 All vibration isolation and seismic control materials specified herein shall be provided by a single manufacturer to assure single responsibility for their proper performance. Installation of all vibration and seismic control materials specified herein shall be accomplished following the manufacturer's written instructions.

1.02 The Contractor shall furnish a complete set of shop drawings and other necessary information, of all mechanical equipment to receive vibration isolation and seismic devices, to the vibration isolation and seismic control materials manufacturer. The information to be furnished shall include operating weight of the equipment to be isolated, distribution of weight to support points and dynamic characteristics along with any internal isolation systems to be analyzed. The Contractor shall also furnish a complete layout of piping and ductwork to be isolated, including vertical risers, showing size or weight and support points of the piping and ductwork system, to the vibration isolation and seismic control materials manufacturer, for selection and layout of mountings.

1.03 The vibration and seismic control materials manufacturer shall use the above listed information to design a complete system of vibration and seismic mounts in accordance with the contract documents along with the International Building Code with date as indicated on the code analysis section of the contract documents, SMACNA “Seismic Restraint Manual” latest edition, and ASHRAE HVAC Applications handbook, Sound and Vibration Control section, latest edition. The vibration and seismic control materials Contractor shall analyze all “multiple degrees of freedom” systems and provide properly designed isolation systems avoiding all resonance frequencies. To accomplish this, the vibration and seismic control materials supplier shall employ an Engineer registered in the State of South Carolina to design all isolation and restraint systems and prepare a complete set of calculations and shop drawing submittals with his professional Engineer’s seal certifying that the design meets all requirements of these contract documents. A seismic design “errors and omissions” insurance certificate must accompany submittals from the vibration and seismic Engineer. Manufacturer’s product liability insurance certificates are not acceptable.

1.04 The vibration and seismic control Engineer or his designated representative shall inspect the project upon completion of the applicable work and provide written certification that the installation is in compliance with the approved shop drawing submittals. This certification shall also bear the professional Engineer’s seal and shall become part of the contract closeout documents. All seals shall be signed and dated appropriately.

1.05 Vibration and seismic control systems shall be provided by Vibration Mounting and Controls, Mason Industries, Consolidated Kinetics, or prior approved equal.

PART TWO - PRODUCTS AND EXECUTION:

2.01 VIBRATION ISOLATION:

A. All mechanical equipment shall receive external vibration isolation. Internal component isolation of equipment shall not be considered equivalent but shall be considered when analyzing systems with multiple degrees of freedom.

B. Vibration isolators shall be selected based upon known operating weight distributions and dynamic characteristics of the isolated equipment, with the quantity and location as required by the component drawing. Isolator type shall be tabulated for each isolated piece of equipment. Complete calculations of vibration analysis shall be included with submittals, including but not limited to fundamental and harmonic frequencies.

C. Isolators shall have either known non-deflected heights of spring element or calibration markings so that, after adjustment, when carrying their load, the deflection under load can be verified to determine if the load is within the proper range of the isolator and if the correct degree of vibration isolation is being provided.

D. Isolators shall function in the linear portion of the load versus deflection curve. Theoretical vertical natural frequency shall not differ from the design objectives by more than + 10%.

E. Spring mounts shall have seismic housings as required by Paragraph 2.02.

F. Isolation of equipment shall be as follows:

1. Suspended equipment shall be isolated form the building structure by means of noise and vibration isolators. Units shall be supported with spring and neoprene type isolators, springs to be as described above. Isolators shall be VMC Series RSH.

2. Roof mounted equipment shall be isolated from the building structure by means of a structural aluminum or hot dipped galvanized structural steel isolation curb. The structural spring isolation curbs shall bear directly on the roof support structure and be flashed and waterproofed into the roof’s membrane waterproofing system. Roof curbs shall be installed to accommodate the pitch of roof. Contractor shall provide and install all supplemental steel required for

seismic attachment of curb to structure as designed by manufacturer. Field fabricated curbs shall not be used. Curb shall come factory assembled. No bolt together corners will be allowed. The curb shall consist of a rigid lower section containing properly spaced pockets with fully adjustable spring isolators. All springs shall be color coded for proper identification and spring pocket shall allow for easy removal or replacement of any spring without disturbance of the supported equipment. Pockets shall have removable waterproof covers to allow for spring adjustment. Spring pockets shall contain combination vertical and horizontal restraint in conjunction with a 1/4-inch-thick neoprene rubber bushing which will resist wind and seismic forces. All springs shall be installed in series with a 1/4-inch-thick neoprene acoustical cup or pad. Curbs supplied shall be factory acoustically lined with 1 inch 3 PCF duct liner. An air tight neoprene seal shall be incorporated into the curb design to prevent air leakage or infiltration. Air seal must not be exposed so that it could be damaged or that in the event of the air seal failure, water could leak into the curb's interior. Wood nailer and flashing shall be provided and curbs shall be manufactured to NRCA standards. Curbs shall include a means of incorporating a sound barrier package, consisting of two layers of waterproof gypsum board furnished and installed by the Mechanical Contractor. Provide 6", R-19 sound attenuating batt insulation equal to Certa Sound as manufactured by Certainteed, batt insulation shall fill all voids within the curb between the roof deck and the unit above. Additionally, the mechanical contractor shall provide ½" treated plywood around the entire perimeter of the curb over the rigid insulation supplied by the roofer to allow for roofer to properly flash curb. Individual pier supported curbs are not acceptable. Roof equipment supports to be VMC type P or R.

3. Mechanical equipment as noted shall be mounted on a rigid structural steel base. The equipment including the base shall be mounted on or suspended from vibration isolators as applicable. Base shall be VMC Type WFB.

4. Floor mounted equipment as noted shall be provided with a noise and vibration isolated structural steel concrete slab inertia base mounted on isolators. Spring mounts shall be recessed at corners. Inertia base shall be VMC Type MPF or WPF as applicable.

2.02 SEISMIC CONTROL:

A. All mechanical equipment, piping, ductwork, etc. shall be provided with seismic restraints in accordance with the International Building Code, International Mechanical Code, and SMACNA Seismic Restraint Manual, Latest Edition requirements, as a minimum.

1. All equipment isolated or not, shall be bolted to the structure to allow for seismic acceleration with no failure or displacement. All connections shall be positive bolted type; no friction clamps of any kind are allowed.

2. Provide cable and connection sets for suspended equipment at each of four corners secured to the building structure.

3. Provide seismic roof curb systems fastened to roof structure for roof top equipment.

4. Floor mounted equipment shall be provided with seismically housed springs or springs with seismic snubbers as determined by the equipment to be isolated.

END OF SECTION 15890

SECTION 15900 - CONTROLS

PART ONE - GENERAL:

1.01 The control equipment shall be the standard product of a single, reputable control manufacturer and shall be installed by trained mechanics regularly employed by the control manufacturer. The system shall be the electric type. A typewritten control sequence shall be framed and displayed where directed.

1.02 All items of equipment, materials, and labor necessary and/or incidental to the hereinafter specified sequence of operation shall be provided with the control system. Items such as auxiliary controls, interlocks, relays or other sequencing devices shall be fully coordinated with the heating and cooling equipment approved for the installation.

1.03 All control wiring required for this installation is included in this contract and shall be color coded. All control wiring shall be in conduit. Conduit, wiring sizes, and type of insulation shall be in accordance with DIVISION 16E - ELECTRICAL, and shall conform to the latest issue of the National Electrical Code. All electrical equipment shall bear UL labels. Each control circuit shall be protected by a circuit breaker of the proper size.

PART TWO - PRODUCTS AND EXECUTION:

2.01 SMOKE WALLS:

A. Contractor shall provide circuits, conduit, wire, detectors, and listed operator/smoke damper at each duct penetration of a smoke wall in accordance with NFPA 72 and 90A.

2.02 THERMOSTATS/HUMIDISTATS:

A. Thermostats shall be mounted 48" above finished floors, unless otherwise noted. Provide heavy-duty key lock steel guards by "AA" Industries, Model T18L secured to wall with lead anchors and #10 screws or equal by Shaw-Perkins.

2.03 CONTROLLERS:

A. All controllers shall be labeled with engraved bakeolite plastic plates indicating control function and correct set point. Label shall clearly relate to controller by functional name as indicated on control wiring diagram.

2.04 FIRE PROTECTION:

A. All air handling units 2000 CFM and above shall be provided with smoke detectors in the return air ducts and smoke dampers in accordance with the International Mechanical Code. Air handling units that are a part of a smoke control system shall have smoke detectors and smoke dampers regardless of capacity.

B. The smoke detectors shall be designed to detect combustion gases, fire and smoke in the supply and return air streams of the air handling units as indicated. The smoke detectors shall consist of sampling tubes which extend into the return and supply air section and, while the fan is operating, shall continuously sample air. The smoke detector shall be of the ionization type. Materials and equipment shall be the standard catalogued products of concerns regularly engaged in the manufacture of the products and shall be the latest standard design that conforms to the specification requirements and bear the UL label and Factory Mutual Laboratories label. The smoke detection system shall be interlocked with the smoke dampers and air handling unit fan motor and shall, when energized, close the smoke dampers and shut down the fan motor. Smoke dampers shall be wide open before air handling unit fan motor begins operating. Smoke detectors shall have reset switch and red alarm light. Provide extra contacts for tie-in with building fire alarm system. If no fire alarm system is provided under Division 16, this Contractor shall provide an alarm panel with visual and audible signals for each detector with a location map. Graphic annunciator panel shall be located at a constantly attended location per I.M.C. Section 6.06.4.1. Coordinate location with Owner and Architect. Installation shall meet requirements of NFPA 72.

C. Smoke Dampers: Dampers shall meet the requirements of NFPA 72, 90A, UL 555 and 555S. All damper frames shall be constructed of No. 13 gauge galvanized sheet metal and shall have hat-shaped end channels for duct mounting. Damper blades shall not exceed 6" in width. All blades are to be corrugated type construction, fabricated from two sheets of No. 22 gauge galvanized sheet-metal spot welded together. All damper blade bearings are to be made of oil impregnated sintered bronze and will turn freely in the frame. Replaceable synthetic elastomer seals shall be provided. The dampers shall be provided with seals installed along the top, bottom and sides of the frame and along the upper edge of each blade edge. Seals shall provide a tight-closing, low-leakage damper. Leakage and flow characteristics charts shall be submitted prior to installation of dampers.

D. Furnish shop dampers to ductwork contractor for installation. Control contractor shall supervise damper installation.

E. For air handling units 2000 CFM and under capacity but serving an area used for

egress, provide smoke detectors in accordance with International Mechanical Code requirements.

F. Provide necessary control devices and wiring to shut off kitchen make-up air units upon activation of the kitchen hood fire extinguishing system. Provide controls to shut off hood exhaust fans when exhaust air temperature reaches 350 degrees F. Interlock with building fire alarm system.

G. Provide ionization type smoke detector in the inlet of each exhaust fan of 15,000 CFM or more. Sampling tubes shall detect combustion gases and/or smoke and stop the fan when detector is activated. Detector unit shall be equipped with reset switch and red alarm light. Provide extra contacts for tie-in with building fire alarm system.

2.05 ENERGY MANAGEMENT SYSTEM (EMS) - (SEE EMS SPEC. SECTION):

A. Provide control center located as indicated on the HVAC drawings, per Section 159XX of the specifications. The control center shall contain numbered terminals of sufficient quantity to permit the required connections. Provide two 120v power supplies and a water pipe ground wire inside control center.

B. Provide conduit and install Belden #9967 2-conductor shield cable from panel to main distribution switchboard. Provide current transformers on main bus bars for demand limiting function.

2.06 CERTIFICATION:

A. Furnish to the Architect/Engineer two copies of certification signed by authorized representative of the control company that:

(1) Control system has been checked-out and operates according to drawings and specifications.

(2) All controls are guaranteed unconditionally for one year from date of acceptance and will be serviced for this period free of charge.

(3) Photostatic copies of as-built wiring diagram and control zones have been framed under glass and posted on job.

(4) Maintenance personnel or responsible party has been instructed as to the operation of control system. Keys for guards and control centers have been turned over to Owner.

B. The control and energy management systems shall be as manufactured by Siemens.

END OF SECTION 15900

SECTION 15904 ENERGY MANAGEMENT SYSTEM (DDC HEAT PUMP)

PART ONE - GENERAL:

1.01 GENERAL:

A. This specification defines the minimum equipment and performance requirements for a direct digital control building control system.

Acceptable manufacturer is as follows:

- Siemens

1.02 SUBMITTALS/DRAWING:

A. The Control Contractor shall submit prior to installation a set of installation drawings and control strategies for review by the Consultant and/or Owner's representative. These drawings shall include the physical location of building control system equipment and system architecture. The complete sequence of operation of the control system shall be provided.

B. Upon completion of the installation and final system adjustment, the Control Contractor shall provide a full set of as-built drawings of the installation and the control strategies. In addition, the Control Contractor shall provide a floppy disk containing the as-built control drawings in AutoCAD format.

C. Framed control diagrams shall be mounted on the wall inside the appropriate mechanical room.

1.03 GUARANTEE:

A. The entire control system shall be installed by the control manufacturer and guaranteed free of defects and shall include required servicing and maintenance for a minimum of one (1) year after final acceptance.

PART TWO - PRODUCTS AND EXECUTION:

2.01 CONTROL AND INTERLOCK WIRING:

A. All electrical work required under this section of specifications shall comply with the latest National Electrical Code. Control system power supply shall be served by a separate breaker and fused in control center for secondary protection.

B. The mechanical contractor shall furnish and turn over to the electrical contractor, motor starters for mounting and power connections thru starter to motor. Disconnect switches when required shall be furnished by electrical contractor.

C. All control wiring shall be run in rigid conduit below grade or, on outdoor installation. Galvanized EMT may be run in dry wall construction, above ceilings, or in equipment rooms where permitted by electrical specifications.

D. Control wiring shall be color coded #16 TFF of TFFN wire with 600-volt insulation. Run all wiring between terminal points without changing color. Color code of control wiring shall be as indicated on control wiring diagram. Multi-conductor thermostat cable will not be acceptable.

2.02 TRAINING/OWNER'S INSTRUCTION:

A. The Control System Contractor shall provide two (2) copies of an operator's manual describing all operating and routine maintenance service procedures to be used with the system. The Control Contractor shall instruct the Owner's designated representatives in these procedures during the start-up and test period. The duration of the instruction period shall be no less than eight (8) hours. These instructions are to be conducted during normal working hours. The instructions shall consist of both hands-on and classroom training at the job site.

2.03 SYSTEM ARCHITECTURE:

A. The building control system shall consist of a network of independent, stand-alone control units (SCU) and terminal equipment controllers (TEC).

B. The SCU's shall interface to a new color graphic central operator's computer. All graphic software shall be provided to match the existing graphic format.

C. Under this contract, a graphic display shall be created for each of the following:

- overall building layout with temperatures displayed
- heat pump unit
- VAV units
- ventilation air units
- VAV boxes
- fans
- water heaters
- lighting controls

2.04 OPERATOR INTERFACE:

A. The building control system shall permit full operator communication including: obtaining information about the performance of his system, allowing the operator to change the system operation, and diagnosing system malfunctions. Operator

communication shall be through the use of any one of the following operator terminals, each of which shall be supplied under this contract:

*portable laptop computer
*printer
*central operator's computer

B. The network shall be addressable as a whole and shall not require referencing a particular control unit for the commanding or monitoring of points on the network.

2.05 LAN CONTROLLER UNIT (LCU):

A. Each control unit shall be capable of full operation either as a completely independent unit or as a part of the building-wide control system.

B. Control strategies shall be Owner definable at each control unit, and for all control units in the system from any one (1) operator terminal. Each control unit shall provide the ability to support its own operator terminal if so desired.

C. Each LAN Controller unit shall include its own microcomputer controller and power supply. All memory shall be stored in an eeprom chip so as to never lose memory upon power failure.

D. The LCU (field panel) shall be furnished with a use programmable language and internal memory of at least 128K RAM for local storage of extended trend date.

E. The LCU (field panel) shall have built-in diagnostics to display at the operator terminal the amount of available RAM in each LCU (field panel) on the network.

F. The network shall be able to detect changes in any LCU's (field panel's) and terminal equipment controller's point status, and report this change to all terminals accessing the network.

G. The operator shall have the capability to override the operation of any LCU (field panel) or terminal equipment controller by command at a terminal connected to any LCU (field panel) on the network. The LCU (field panel) shall accept and execute operator commands to override all terminal equipment controller functions including set points from the LCU (field panel) operator terminal.

2.06 TERMINAL EQUIPMENT CONTROLLERS:

A. Terminal equipment controllers shall be provided for each piece of equipment as specified. The energy management system shall support specific controllers for the following types of equipment as a minimum:

1. heat pumps
2. ventilation air units

3. vav units
4. vav boxes
5. exhaust fans
6. water heaters

B. Controllers shall include all point inputs and outputs necessary to perform the specified control sequences.

C. Each controller performing space temperature control shall be provided with a matching room temperature sensor. The sensor may be either RTD or thermistor type.

1. Each room temperature sensor shall include a terminal jack integral to the sensor assembly. The terminal jack shall be used to connect a portable laptop or similar operator's terminal to control and monitor all hardware and software points associated with the controller.

2. Each room sensor shall also include the following auxiliary devices:

- Set point Adjustment Dial
- Digital Temperature Read-Out
- Override Switch

3. The set point adjustment dial shall allow for modification of the temperature by the occupant. Set point adjustment may be locked out, overridden or limited as to time or temperature through software by an authorized operator at the central workstation, LCU, or via the portable programming tool.

4. The override switch shall initiate override of the night setback mode to normal (day) operation when activated by the occupant. The override function may be locked out, overridden or limited as to the time through software by an authorized operator at the central workstation, LCU, or via the portable programming tool.

5. Each heat pump will have a supply air temperature sensor connected to its corresponding TEC.

E. Each controller shall have connection provisions for a portable laptop or similar operator's terminal. This connection shall be possible at both the controller and at the matching room temperature sensor as previously specified. The terminal may be used for readout of system variables, override control, adjustment of control parameters, air balancing, servicing and troubleshooting. The terminal shall provide the user with the following functionality as a minimum:

- Display system status (heating, cooling, etc.)
- Display all point values and set points
- Set and change all set points
- Set and change heating/cooling dead-bands

- Set and change PID loop gains
- Set and change system mode (occupied/unoccupied)
- Set and change system mode times
- Override all set points
- Override all digital and analog outputs
- Command all digital and analog outputs
- Select application mode
- Assign controller address

1. All communication and displays via the portable terminal shall be in full English language with accompanying English and SI (International System of Units) engineering units for all displayed data. Selection between English and SI units shall be accomplished via a single keystroke on the portable terminal.

2. In addition to local interface capabilities, all functionality as specified above may be performed both from the central operator's workstation and from any LCU on the communications network via the same portable terminal. From a terminal connected to any LCU it shall be possible to issue global commands to groups of controllers. All commands shall be able to be changed globally from any graphic in the system.

2.07 BUILDING CONTROL FUNCTIONS:

A. The LAN Controller unit shall be capable of performing the following energy management routines as a minimum:

*time of day scheduling
*start/stop time optimization
*duty cycling (temperature compensated)
*event-initiated programs

B. The system shall permit the generation of job-specific control strategies that can be activated in any of the following ways:

*continuously
*at a particular time-of-day
*on a pre-defined date
*when a specific measured or controlled variable reads a selected value or state
*when a piece of equipment has run for a certain period of time

C. Upon a loss of commercial power to any control unit, the other units within the network shall not be affected, and the loss of operation of that unit shall be reported at the designated operator's terminal. Upon resumption of commercial power, the control unit shall resume full operation without operator intervention. The unit shall also automatically reset its clock such that proper operation of timed sequences is possible without the need for manual reset of the clock.

2.08 DIAGNOSTICS:

A. The system shall also allow on-line diagnosis via telephone modem from a remote location (vendor's headquarters of local branch office or other remote site).

2.09 SEQUENCE OF OPERATION:

A. Heat Pumps:

1. A Terminal Equipment Controller (TEC) shall be provided for each heat pump. The TEC shall enable the heat pump for operation according to its individual occupied/unoccupied schedule. The TEC shall control the heat pump stages of heating and cooling to maintain the space temperature set points.

2. Motorized outside air dampers shall remain closed during all unoccupied times. Motorized outside air dampers shall remain closed upon the initial startup of the applicable heat pumps. After the room has reached its warm-up or cool-down temperature, the outside air damper shall open. For packaged heat pumps with energy recovery ventilators, ventilators shall operate only during occupied hours.

3. When commanded to change over to the Unoccupied Mode, the terminal equipment controller shall raise the cooling set point and lower the heating set point to an operator determined value.

4. During the Unoccupied Mode, the terminal equipment controller may be reset to the Occupied Mode for an operator determined time period. This reset shall be activated by a signal from a local override switch on the room temperature sensor or by command from the operator's terminal. At the end of the operator determined time period, the terminal equipment controller shall return to the Unoccupied Mode.

5. For packaged heat pumps with hot gas reheat, a separate humidistat shall be provided to control humidity to a predetermined level.

B. Ventilation Air Units:

1. A Terminal Equipment Controller (TEC) shall be provided for each unit. The TEC shall enable the unit for operation according to its individual occupies/unoccupied schedule. The TEC shall control the stages of cooling to maintain the space temperature and humidity set points.

2. Controls Contractor shall provide space humidity transducers as required.

3. During Occupied Mode the ventilation air units shall provide dehumidified air to each classroom as scheduled on the plans. CO2 sensors in each space will control modulating bypass dampers at ventilation air unit. The most demanding sensor will control the amount of outside air taken in relative to re-circulated air.

Ventilation air unit shall remain in re-circulation mode until most demanding sensor reaches 1000 ppm.

4. During the Unoccupied Mode, the terminal equipment controller may be reset to the Occupied Mode for an operator determined time period. This reset shall be activated by a signal from a local override switch on the room temperature sensor or by command from the operator's terminal. At the end of the operator determined time period, the terminal equipment controller shall return to the Unoccupied Mode.

5. Programming of unit shall be as recommended by manufacturer.

C. VAV Air Handling Units:

1. Each air handling unit shall be optimally started and stopped by the control system according to its occupied and unoccupied schedule. The AHU smoke dampers shall open, and then the supply fan shall ramp up to its cooling airflow (CFM).

2. For units utilizing outside air for ventilations, during unoccupied hours and morning startup operation, the motorized outside air damper shall remain closed. When in occupied operation, the outside air damper shall modulate to maintain its minimum required outside airflow (CFM) as measured by a duct airflow station. For units connected to ventilation air units, the motorized isolation damper shall be closed whenever the unit is stopped.

3. At duct static pressure transmitter shall be located at two-thirds the distance down the longest duct run and shall allow the controls to operate the supply fan VFD in order to maintain the duct static pressure setpoint. A duct static pressure high limit switch shall shut down the air handling unit and alarm the control system if its set point is exceeded. Operate units based on supply air static pressure and temperature reset.

4.The air handling unit supply air temperature shall be controlled to maintain its setpoint.

5. AHU duct smoke detectors shall be provided and installed under this section of the Specifications. Wiring the AHU duct smoke detectors to the fire alarm system shall be accomplished by Division 16. Interlock wiring for shutdown of the air handling units for the AHU duct smoke detectors shall be accomplished under this section of the Specifications. The AHU duct smoke detectors will alarm the system in the event that products of the combustion are detected.

6. The AHU will be provided with a filter status airflow switch across the AHU filter bank which will alarm the system when the airflow pressure drop exceeds its setpoint.

D. VAV Boxes with Electric Heat:

1.During the occupied mode, the Terminal Equipment Controller (TEC) modulates the primary supply air damper within user defined separate heating and cooling maximum and minimum air volume settings by sensing the inlet air velocity (CFM).

2. On a rise in temperature above the room cooling setpoint, the Terminal Equipment Controller (TEC) shall modulate open the duct supply air damper to maintain room temperature.

3. Similarly, on a fall in temperature below he room heating setpoint, the Terminal Equipment Controller (TEC) shall modulate the supply duct damper to its minimum position of 50% of rated air flow, and then the electric heating coil shall be modulated to maintain the room temperature.

4. When commanded to change over the Unoccupied Mode, the Terminal Controller shall raise cooling setpoint and decrease the heating setpoint (as appropriate) to operator-determined values.

5. During the Unoccupied Mode, the Terminal Controller shall be reset to the Occupied Mode for an operator determined time period. This reset shall be activated by a signal from a local override switch on the room temperature sensor. At the end of the operator determined time period, the Terminal Controller shall return to the Unoccupied Mode.

6. The Controls Contractor shall be responsible for providing power wiring to all VAV box controls as required for proper operation.

E. Exhaust Fans:

1. Exhaust fans shall be controlled by the building energy management system, local thermostat, or wall switch as indicated on the contract drawings and equipment schedule. Operate group toilets based on building occupied schedules.

F. Unit Heaters and Water Heaters:

1. Unit heaters and water heaters shall be controlled by the building energy management system or local thermostat as indicated on contract drawings.

END OF SECTION

MECHANICAL AND ROOFING RENOVATIONS TO ST. JAMES MIDDLE SCHOOL

SECTION 15990 - TESTING AND BALANCING AIR SYSTEMS

PART ONE - GENERAL:

1.01 SCOPE:

A. The Owner shall employ a testing and balancing firm specialized in total system testing and balancing. The balancing firm shall be a member of the Associated Air Balance Council (AABC) or certified by the National Environmental Balancing Bureau (NEBB). The balancing firm shall provide all labor, equipment, engineering and test equipment required to test, adjust, and balance all heating, ventilating, air-conditioning, and exhaust systems as hereinafter specified.

B. Approved Testing and Balancing Firms are:

1. TAB Services, Inc. – Atlanta, GA
2. Carolina Air and Water Balancing – Columbia, SC
3. Hilton Services – White Rock, SC
4. Phoenix Agency, Inc. - Winston-Salem, NC
5. Palmetto Air & Water Balance - Greenville, SC

PART TWO - PRODUCTS AND EXECUTION:

2.01 The balancing contract shall incorporate the following:

2.02 All medium pressure ducts shall be duct air leak tested with less than 5% leakage prior to insulation by the Mechanical Contractor and verified by the TAB Contractor. Note that all VAV systems that include VAV boxes and utilize static pressure sensors for fan operation, regardless of operation static pressure, shall be considered medium pressure and therefore require duct air leak testing.

2.03 Test, adjust and balance the complete mechanical system.

2.04 Upon completion of the air handling systems, the Contractor shall have an air balancing firm perform the following tests and compile the following information for each item of equipment and submit four bound copies of this information to the Architect for approval.

2.05 Install at each piece of mechanical equipment, a "Data Register" showing all significant operating temperatures, pressures, amperes, voltage, brake horsepower, etc. "Data Register" to be enclosed in a vina-film holder securely attached to the equipment or wall in immediate area after balance reports have been accepted. See section 2.10 for data to be included in certified report.

2.06 All test equipment will be furnished by the Balancing Contractor and will remain his property. All instruments will have been calibrated recently.

2.07 The Balancing Firm shall warrant solely that the system will be set to within 10% of the values as established by the plans and specifications, and also adjust to minimize drafts in all areas.

2.08 Any changes that are required for the final balancing results as determined by the Balancing Contractor will be provided by the respective Contractors who are to supply and install such equipment under their contractual obligations. Such changes may encompass, but are not necessarily restricted to, the changing of pulleys, belts, dampers, or adding dampers or access panels. The General Contractor shall be responsible for providing access to all devices that are not accessible from a 12' ladder.

2.09 TESTING AND BALANCING PROCEDURE (AIR):

A. Before starting air balance, check the following items:

1. Check air filters to be sure they are clean and in position.
2. Check for proper belt tension and alignment.
3. Check fan and motor lubrication.
4. Check motor overload protectors or heaters for proper size.
5. Check for proper rotation.

B. Measure supply air volumes by means of the duct traverse method, taking a minimum of sixteen (16) readings. Seal duct access holes with metal snap-in-plugs. The use of duct tape to seal access holes will not be permitted.

C. Adjust balancing dampers for required branch duct air quantities. Dampers shall be permanently marked after air balance is complete.

D. Adjust grilles and diffusers to within 10% of individual requirements specified, and also adjust so as to minimize drafts in all areas.

E. The total air delivery in any particular fan system shall be obtained by adjustment of the particular fan speed.

F. The drive motor of each fan shall not be loaded over the corrected full load amperage rating of the motor involved.

G. All duct systems are to be balanced for lowest static pressure and lowest fan speed possible to deliver required air quantity as required by ASHRAE Standard 90.1 with applicable adopted year.

H. Unless otherwise noted, adjust quantity of return air from space to pass 90% of air supplied to space.

I. Where splitter and volume dampers have been provided for balancing of air in ducts, balancing shall be done with register and diffuser volume dampers as fully open as possible.

J. Do not operate fans during times when construction process or clearing would allow dirt or rubbish to accumulate in the system.

2.10 TESTING OF EQUIPMENT THERMAL PERFORMANCE:

A. All heating and cooling equipment shall be properly tested for cooling and heating performance

based on the specified data on the mechanical equipment schedules. All systems shall be evaluated based on outside air conditions, mixed return air temperature, coil supply air temperature, building supply air temperatures including fan heat and performance based on entering and leaving air temperatures all heat exchangers. All temperature readings shall be recorded in dry bulb and wet bulb (DB/WB) values to indicate total energy transfer.

B. Ventilation Air Units (VAU): The acceptable tolerance for the coil leaving air temperature conditions for ventilation air units (DB/WB) during design conditions is 0.5 degrees F above stated design values on the schedule. Any ventilation air unit not meeting the coil leaving air temperature shall be noted as a deficiency in the report.

C. Packaged/Applied VAV Units: The acceptable tolerance for the coil leaving air temperature conditions for ventilation air units (DB/WB) during design conditions is 1 degree F above stated design values on the schedule. Any unit not meeting the coil leaving air temperature shall be noted as a deficiency in the report.

D. Note: Any unit with scheduled coil leaving air temperatures on the plans that are not specified as Ventilation Air Units (VAU) shall comply item

2.10 CERTIFICATION:

A. Furnish to the Architect/Engineer two (2) copies of the following data, signed by an authorized representative:

1. Room
2. Supply or Return Size
3. Design CFM
4. Measured CFM
5. Percent of Design CFM
6. Outside air conditions (DB/WB)
7. Mixed air return conditions (DB/WB)
8. Coil leaving temperature (DB/WB)
9. Building supply temperature including fan heat (DB/WB)
10. Heat exchanger performance EAT/LAT (DB/WB) as applicable
11. Hot gas reheat performance to produce neutral air (DB) as applicable
12. Coil delta T in heating (DB)
13. Voltage/amps/phase (Design/Actual)
14. RPM
15. BHP actual / Nameplate H.P.
16. Turns open / ECM fan settings / multi speed motor settings
17. ESP. Design/Actual
18. Installed compressor tonnage
19. Static pressure operating set point at remote sensor (VAV systems)
20. VAV Box maximum and minimum operating setpoints (VAV systems)
21. Verification of BAS Static pressure reset programming (VAV systems)
22. Verification of BAS supply air temperature reset programming (VAV systems)
23. Outside air volume verification, both fixed and variable volume, as scheduled

Note that the above information shall be included in the certified report as a minimum. Additional information shall be provided as required for the equipment utilized.

2.11 FINAL AIR BALANCE:

A. Perform final air balance after building is occupied. On final air balance adjust air quantities as required to maintain space temperatures in building at 74 degrees (summer) and 70 degrees (winter) plus or minus 2 degrees F. Submit data sheets on recorded temperatures. Indicate time of day and outdoor temperature on data sheets.

B. A preliminary Test and Balance Report shall be issued to the Mechanical Contractor and Engineer prior to the issuance of the final Testing and Balancing Report outlining all deficiencies in the installed system. These listed deficiencies shall be corrected and/or resolved prior to finalizing the Test and Balance Report after building occupancy of required.

C. Final Air Balance shall occur prior to Office of School Facilities inspection as applicable.

E. The General Contractor shall account for TAB in the construction schedule. Failure to properly prepare systems for TAB with sufficient time prior to final inspections and/or complete deficiencies found causing delays will result in additional costs billed to the General Contractor.

END OF SECTION

MECHANICAL AND ROOFING RENOVATIONS TO ST. JAMES MIDDLE SCHOOL

DIVISION NO. 16 – ELECTRICAL

SECTION 16010 - GENERAL REQUIREMENTS

PART ONE - GENERAL:

1.01 SCOPE:

A. The General and Special Conditions are a part of this Section of the Specifications.

B. Provide all labor, equipment, material, and operations required for complete, safe, and quietly operating electrical systems in accordance with Specifications and Drawings and subject to terms and conditions of the contract.

C. Drawings and Specifications are complementary and what is called for by either shall be as binding as if called for by both.

D. Examine other Drawings and Specifications and bring to the attention of Architect prior to bid time any omissions or discrepancies in this DIVISION.

1.02 CODES, RULES, PERMITS, FEES, AND APPLICABLE PROVISIONS:

A. Comply with the 2005 edition of the National Electrical Code, 2006 International Building Code, 2003 Life Safety Code, and Municipal Code requirements. In case of conflict, Municipal Code shall govern.

B. The Contractor shall give all requested notices, obtain necessary permits, and pay all required fees.

C. Deliver to Architect permits and certificates.

1.03 DRAWINGS:

A. Project Drawings: The Drawings accompanying this Specification are generally diagrammatic and do not show all details of bolts, nuts, connections, and the like required for the complete system, and do not indicate the exact location of conduit, fixtures, equipment, etc., unless definitely dimensioned or noted. While these Drawings shall be followed as closely as possible, all dimensions shall be checked at the building and any necessary changes shall be made to accord with structural and architectural conditions, equipment to be installed or with the work of the different trades, without additional cost to the Owner, and as directed by the Architect. Any component item which is necessary for the proper operation of any system under this contract shall be furnished and installed by the Contractor without extra charge.

1.04 EXAMINATION OF CONDITIONS:

A. It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality, and quantity of the materials to be encountered, the general and local conditions, and to all other matters which can affect the work under this contract.

1.05 COORDINATION:

A. Coordinate work with other trades to avoid interferences and establish necessary space requirements and tie-ins for each trade.

B. Prior to starting installation, furnish to the General Contractor and all Sub-Contractors concerned, copies of approved shop drawings showing location of equipment, piping, and etc.

C. Schedule periodic meetings with other trades before and during installation to avoid conflicts and assure that conduits and equipment are installed in the best manner, taking into consideration head-room, maintenance, appearance, and replacement.

END OF SECTION 16010

MECHANICAL AND ROOFING RENOVATIONS TO ST. JAMES MIDDLE SCHOOL

SECTION 16040 - GENERAL COMPLETION, ELECTRICAL

PART ONE - GENERAL:

1.01 GENERAL REQUIREMENTS FOR INSTALLATION:

A. Piping, fixtures, equipment, etc., shall be located to avoid interference with structural and architectural conditions, or with the work of different trades. Provide off-sets where necessary to avoid footings, piers, columns, beams, windows, other piping, mechanical systems, and other systems, etc., specifically inform the General Contractor as to the correct size and location of all chases, openings, supports, sleeves, etc., required for the system. Furnish and install sleeves, inserts, bolts, etc., and arrange for the cutting of walls, floors, roofs, etc., and the proper closing of all openings. Cutting of construction, where unavoidable, must be done by the General Contractor, but shall be paid for by the electrical contractor. No part of the building may be broken out, cut, burned, or permanently removed without the approval of the Architect.

PART TWO - PRODUCTS:

2.01 WORKMANSHIP AND MATERIALS:

A. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. The Contractor shall furnish the services of an experienced superintendent, who will be constantly in charge of the erection of the work, until completed and accepted.

B. Unless otherwise hereinafter specified, all materials and equipment shall be new, of best grade, and as listed in printed catalogs of the manufacturer. Each article of its kind shall be the standard product of a single manufacturer.

C. The Architect shall have the right to accept or reject material, equipment and/or workmanship, and determine when the Contractor has complied with the requirements herein specified. Where departures from indicated arrangements are required, written approval for such changes shall be obtained from Architect's representative.

D. All manufactured materials shall be delivered and stored in their original containers. Equipment shall be clearly marked or stamped with the manufacturer's name and rating.

E. All material and equipment used on this project shall be stored in a weatherproof, bonded warehouse. Contractor shall submit insurance certificate to the Architect prior to storing any materials or equipment. No equipment or materials used on this project shall be stored outside exposed to the weather. Before final payment can be made, a notarized statement with the material invoiced to the Owner must be furnished to the Architect.

2.02 DIVISION OF WORK:

A. Coordinate all opening locations with General Contractor, see paragraph 2.03.

B. The electrical contractor shall provide concrete foundations, curbs and pads for electrical equipment and fixtures. Unless otherwise noted, set all floor and/or ground mounted equipment on 6" high concrete pads reinforced with 6 x 6 10/10 mesh. Pads shall be approximately 6" larger than equipment base and have 1" x 1" chamfer on all edges. Pads to have carborundum brick rubbed finish. Surface finish shall be uniformly smooth.

C. General Contractor will provide flashing of conduits into roofing. The electrical contractor shall provide counterflashing.

D. Provide complete power wiring and connections for mechanical systems specified under the mechanical specifications. This work includes all raceways, conductors, outlets, and pull boxes, line voltage, on-off switches where indicated and disconnecting means as indicated and required by applicable codes. Where magnetic motor starters (controllers) are furnished by others, install and wire complete; where controllers are provided already mounted on equipment, wire complete. In all cases, provide power wiring to controller and load controlled. Wire sizes between controllers and loads shall be the same as feeder size to controller, do not reduce. Make all connections and color code per this DIVISION. Safety switch enclosures shall be NEMA Type 3R outdoors and wet locations; NEMA Type 1 elsewhere. Not included in this DIVISION are temperature control wiring, equipment control wiring and interlock wiring required to operate the mechanical system. Refer to the mechanical specifications for a summary list of types of equipment provided under that DIVISION. The electrical contractor shall provide outlet box for thermostat with 3/4" conduit to corresponding mechanical unit. The electrical contractor shall provide a 3/4" empty conduit between indoor air handling unit and exterior heat pump on split system units; this conduit is in addition to thermostat conduit noted above.

2.03 OPENINGS - CUTTING, REPAIRING:

A. The electrical contractor shall cooperate with the work to be done under other Sections in providing information as to openings required in walls, slabs, and footings for all conduits and equipment, including sleeves, where required.

B. All drilling, cutting, and patching required for the performance of work under this Section shall be performed by the General Contractor and the cost thereof shall be borne by the electrical contractor.

C. Holes in Concrete: Sleeves shall be furnished, accurately located and installed in form before pouring of concrete. The electrical contractor shall pay all additional costs for cutting of holes as the result of the incorrect location of sleeves. All holes through existing concrete shall be either core drilled or saw cut. All holes required shall have the approval of the Structural Engineer prior to cutting or drilling.

2.04 EXCAVATION AND BACKFILL:

A. General: The Contractor shall do all excavating and backfilling necessary to receive the work shown on the drawings.

Excavations shall be made to the proper depth, and the trenches shall be graded uniformly to provide solid bearing along the entire length of the conduit. All trenches shall be excavated so that conduits will have at least (6) inches clearance on each side. Conduits in fill or loose sand shall have trench bottom tamped to 95% maximum density compaction prior to laying conduits.

B. Backfilling: Do not fill any trenches until all conduits have been inspected. After the work is installed, tested, inspected, and approved, the trenches shall be refilled in six-inch layers with clean, damp earth, with each layer thoroughly tamped before proceeding with additional layers. Remove from site all excess earth, rock and other debris resulting from excavation and backfill work.

2.05 NAMEPLATES:

A. On all panelboards, disconnect switches, transformers, and enclosures provide engraved phenolic plastic nameplates. Unless otherwise noted, nameplates to be 1/16" thick plastic with 1/4" high white letters on black background. Hand lettering, typing under tape, embossed letters on plastic, etc., will not be acceptable

B. Attach nameplates with two rivets.

2.06 CLEANING EQUIPMENT AND MATERIALS:

A. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage. Provide adequate and proper storage facilities during the progress of the work.

B. All fixtures, conduits, finished surfaces, and equipment shall have all grease, adhesive labels, and foreign materials removed.

2.07 CLEANING UP:

A. Remove from the premises all unused material and debris resulting from the performance of work under this Section.

2.08 DAMAGES:

A. Cost of repairing damage to building, building contents, and site during construction and guarantee period resulting from this work is a part of this contract.

2.09 TEST PERFORMANCE:

A. Upon completion of the work, the system shall be free of faults, including short circuits, grounds, and open circuits, and loads balanced across phases to obtain minimum neutral current in all feeders and branch circuits. All communications systems shall operate at a standard representative of the best state of the art for the particular system involved. All life safety systems shall be demonstrated and certified as to operation in compliance with the codes and the intent of these Specifications. Test system in the presence of the Engineer or his representative, and operate to comply with the true intent of Plans and Specifications. Defray cost of all adjustments required to correct deficiencies; replace defective material and equipment, do not repair.

2.10 FINISHED PLANS:

A. As-built Drawings: Upon completion of the work, the Contractor shall furnish and deliver to the Owner two (2) sets of as-built drawings to correspond in size to the tracings, showing among other things, layouts of utility systems and functional systems (such as public address, fire alarm and telephone). All pertinent dimensions and elevations of buried work shall be given.

2.11 INSTRUCTIONS:

A. Provide a hard back, three-ring file folder containing all warranties, catalog data and the manufacturer's recommendations and the frequency with which each is to be done. Each sheet shall be initialed by the manufacturer's agent as being correct. Provide columns on each sheet so that they may be dated by maintenance personnel when each individual function is performed. Contractor shall furnish a typed maintenance manual in a hard back, three-ring binder explaining all maintenance functions. The Contractor shall instruct and demonstrate each maintenance function to the Owner's Representative. The Owner's Representative shall in turn sign the maintenance sheets indicating his under-standing of the instructions. Coordinate all equipment start-ups with the Owner, so that they may be present.

B. The Contractor shall instruct the Owner's Representative in complete detail as to the proper operation of the overall systems. Advise the Owner as to where to order common replacement items. Deliver to the Owner the manufacturers’ agent’s name, address, and the telephone number of each piece of equipment.

2.12 GUARANTEE:

The Contractor agrees:

A. To correct defects in workmanship, materials, controls, equipment, and operation of the system for a period of one (1) year from the date of acceptance.

B. To remove any item not specified or given written approval and replace it with the specified item.

C. That the systems installed will safely, quietly, and efficiently perform their respective functions in accordance with the design.

END OF SECTION 16040

MECHANICAL AND ROOFING RENOVATIONS TO ST. JAMES MIDDLE SCHOOL

SECTION 16050 - BASIC MATERIALS AND METHODS

PART ONE - GENERAL:

1.01 APPROVALS AND SUBSTITUTIONS:

A. All requests for substitutions shall be submitted so as to be received by the Engineer at least ten (10) calendar days before bid date. Approved material will be listed in addendum form.

B. Contract prices shall be based on material and equipment as specified, unless written approval is obtained for any deviations. Requests for substitutions before bid date may be submitted by Contractors or by Equipment Manufacturer's Representatives.

C. Requests for approvals should be submitted in the form of a letter (with one copy minimum) on a letterhead of submitting firm, along with a self-addressed, stamped, return envelope. Letter shall be addressed to the Engineer and referenced to this project.

D. If there are no deviations between the items submitted and the plans and specifications, then the submittal letter should contain the statement, "Items are in accordance with plans and specifications with no deviations". An item with deviations from the plans and specifications may be submitted for approval consideration. Letter should then state, "Item submitted is in accordance with plans and specifications, except for the following deviations." Deviations should then be listed in itemized form.

E. Items approved shall not be construed as authorizing deviations from the plans and specifications. Contractor shall be responsible for verifying all dimensions with available space conditions with provisions for proper access, maintenance, and part replacement, and for coordination with other trades - mechanical, plumbing, structural, etc., for proper services and construction requirements.

F. Where such approved deviations require a different quantity and arrangement of wiring, conduit and equipment from that specified or indicated on the drawings, the Sub-Contractor shall furnish and install any such structural supports, controllers, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

PART TWO - PRODUCTS AND EXECUTION:

2.01 MANUFACTURER'S INSTRUCTIONS:

A. Prior to purchasing equipment, procure product manufacturer's application, installation, and operating instructions for use in conjunction with the system design drawings and specifications during construction. If there exists any conflict between the manufacturer's publications and the design drawings and specifications, immediately notify the Engineer, in writing. Upon notification by the Engineer, proceed in accordance with his instructions.

2.02 Operations and Maintenance Manuals:

A. Prior to project closeout, the Sub-Contractor shall submit for approval, a completed operations and maintenance manual to the engineer for review. The operations and maintenance manual shall contain at least the following items. Exclusion of items is permissible only when the scope of electrical work outlined in these contract documents does not include an item listed below:

1. Electrical Contractor's warrantee / guarantee showing dates of acceptance and duration.
2. Product data sheets, diagrams, performance curves, and charts published by the manufacturer. Complete electrical characteristics and manufacturer's part numbers shall be provided for all equipment.
3. Charts which explain the conduit color coding scheme used for conduit and wire throughout the facility.
4. Insulation resistance test results for all feeders.
5. Operating & users instruction manual(s) for Lighting control systems
6. Final circuit breaker trip and time delay settings
7. Chart listing fuse ampacity, type and manufacturer's part number installed in each disconnect.
8. Operating & users instruction manual(s) for any generators, transfer switches, or lighting inverters.
9. Copy of the UL "Master Label" for any lighting protection system required elsewhere in the contract documents.
10. Operating & users instruction manual(s) for the fire alarm system.
11. As built shop drawings and plans for the fire alarm system indicating device locations and all calculations.
12. Digital media with as built fire alarm system program and all required programming password & user names.
13. Copy of the fire alarm system paperwork required by the NFPA to be completed by the fire alarm system installer.
14. Operating & users instruction manual(s) for the security, telephone, public address, or sound augmentation and reinforcement systems.
15. A copy of the seismic submittal for electrical installation signed and sealed by the seismic engineer.

2.03 SHOP DRAWINGS:

A. The Sub-Contractor shall submit for approval detailed shop drawings of all equipment and all material required to complete the project, and no material or equipment may be delivered to the job site or installed until the Sub-Contractor has in his possession the approved shop drawings for the particular material or equipment. The shop drawings shall be complete as described herein. The Sub-Contractor shall furnish the number of copies required by the General and Special Conditions of the contract, but in no case less than six (6) copies.

B. Prior to delivery of any material to the job site, and sufficiently in advance of requirements to

allow Architect ample time for checking, submit for approval detailed, dimensioned drawings or cuts, showing construction, size, arrangement, operating clearances, performance characteristics and capacity. Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equal quality, finish, and durability to that specified.

C. Samples, drawings, specifications, and/or catalogs submitted for approval shall be properly labeled indicating specific service for which material or equipment is to be used, section and article number of specifications governing, Contractor's name, and name of project.

D. Catalogs, pamphlets, or other documents submitted to describe items on which approval is being requested, shall be specific and identification in catalog, pamphlet, etc., of item submitted shall be clearly made in ink. Data of a general nature will not be accepted.

E. Approval by the Architect and/or Engineer of shop drawings for any material, apparatus, devices, and layouts shall not relieve the electrical contractor from the responsibility of furnishing same of proper dimension, size, quantity, quality, and all performance characteristics to efficiently perform the requirements, and intent of the contract documents. In addition, approval shall not relieve the electrical contractor from responsibility for errors of any sort on the shop drawings. If the shop drawings deviate from the contract documents, the electrical contractor shall advise the Architect and/or Engineer of the deviations, in writing, accompanying the shop drawings, including the reasons for deviations.

F. Failure of the Sub-Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension on contract time, and no claim for extension by reason of such default will be allowed.

G. The table on the following pages shall be included in the front of the shop drawing submittal. Sections of the specifications that are included in the specifications manual for this project shall require a submittal for each item listed. Incomplete or partial submittals shall be rejected.

Spec Section	#	Item Description
Site Lighting	1	Landscape lighting fixtures
	2	Lamps
	3	Type FSIFP outlet boxes
General Completion	1	Insurance Certificate indicating that stored materials are held in a bonded warehouse
	2	Superintendent's name, job trailer phone and fax numbers
	3	Name Plates type and attachment method
Conduit	1	Conduit , Cables, Tubing
	2	Supports
	3	Fittings and connectors
	4	Expansion joints
	5	Ground Bushings
	6	Tracing tape
	7	Sealants
	8	Fire Wall Penetrations (Provide U.L. Listing Number)
Busways	1	Busway
Under floor Ducts	1	Duct system sharing joiners, spaces, covers, supports, seats, etc.
Surface Metal Raceway	1	Surface raceway system - include all components
Wires and Cables	1	Wire – minimum size, manufacturer, insulation type
	2	Connectors and lugs
Outlets, Switches & Boxes	1	Outlet boxes
	2	Floor Boxes
Wall Switches	1	Switches (Also indicate color, load type, terminal type, and rating)
	2	Plates
Receptacles	1	Receptacles
	2	Plates
Lighting Control Relay System	1	Relay cabinet and relay modules
	2	Override switches
	3	Cables

Spec Section	#	Item Description
	4	Photocells
Dimming System	1	Dimmer panel and dimmer modules
	2	Control consoles
Lighting Control Sensors	1	Sensors
	2	Power Packs
Motor Starter	1	Motor starters
Motor Control Center	1	Documentation showing installers experience with submitted system
	2	Motor control center with all components and appurtenances.
Panel boards	1	Panel boards (also indicate short circuit current rating and withstand rating)
Fuses	1	Fuses
	2	Fuse Cabinet
Main Switchboard	1	Main Switchboard (also indicate short circuit current rating and withstand rating)
Motor & Circuit Disconnects	1	Disconnect Switches
Dry Type Transformers	1	Dry type transformers
Pad Mounted xformers	1	Pad mounted transformer
Generator Set	1	Generator
	2	Transfer Switch
	3	Vibration Isolation
	4	Mounting / pad dimensions
	5	Cooling system
	6	Exhaust system
	7	Control system
	8	Engine heater
	9	Battery and charger
	#	Main line circuit breaker
External TVSS / SPD	1	Surge Protective Devices
Underground Electrical Work	1	Ground rods

Spec Section	#	Item Description
Service and Metering	1	Meter sockets
	2	CT cabinets
Grounding	1	Grounding devices and fitting
	2	Ground rods
Lighting Fixtures	1	Light Fixtures
	2	Lighting Control Systems
	3	Arc Keeper Devices
	4	Generator Transfer / Switch bypass devices (GTD)
	5	Occupancy Sensors
	6	Lighting Inverter Systems
Exterior Sports Lighting Poles	1	Data and calculation showing that submitted pole complies with contract documents
	2	Data and calculation showing that submitted foundation complies with contract documents
	3	Poles
	4	Foundations
	5	Lighting protection system
Emergency Lighting System	1	Inverter units
	2	Battery charger
	3	Batteries
	4	Cabinets
Fire Alarm System	1	Fire Alarm System Control Panel
	2	Power Supply / Batteries
	3	Smoke Detectors / Heat Detectors
	4	Addressable modules
	5	Cables and Wiring
	6	Manual Pull Stations
	7	Notification Devices
	8	Documentation that certifies that the installer has been factory trained on the submitted system.
Security System	1	Control panel

Spec Section	#	Item Description
	2	Control key pads
	3	Enclosure
	4	Magnetic door contacts
	5	Motion detector
	6	Sounder
Office phone Sys.	1	Telephone system control cabinet
	2	Hand/desk sets
	3	Wire and cables
Integrated Telecomm / Telemedia Systems	1	Integrated telephone, public address and telemedia control system
	2	Outline drawing of system control cabinet
	3	FCC registration number with signal equivalent
	4	Wiring diagrams showing typical connector
	5	Certification of completion and installation and service training from system manufacturer
Classroom Intercom, Master-clock & Program System	1	Console
	2	AM-FM tuner, cassette player
	3	AM-FM antenna
	4	Administrate telephone
	5	Staff telephone
	6	Room call-in switch
	7	Digital master clock
	8	Speakers/ back boxes
	9	Exterior speakers
	10	Cable
Public Address System Replacement	1	Equipment cabinet
	2	Control panel
	3	AM-FM tuner, cassette player
	4	Power amplifier
	5	Selection panels
	6	Master clock and program distribution system

Spec Section	#	Item Description
	7	Room call-in switch
	8	Speakers/ back boxes
	9	Exterior speakers
	10	Cable
Public Address Communication Sys (w/phones)	1	FCC registration number of the submitted system
	2	Data sheets for all equipment being provided
	3	Internal control cabinet drawings showing internal block diagram connections
	4	Wiring diagrams showing typical field wiring connections
	5	Documentation that installer maintains service and parts for submitted system
Sound Augmentation Systems	1	Microphones, receptacles, extension cables and stands
	2	Mixer/ pre-amp
	3	Amplifiers
	4	Cables
	5	Equipment housing
	6	CD player
	7	Monitor headphone
	8	Equalizer
	9	Crossover network
	10	High frequency horns and drivers
	11	Low frequency loudspeaker and enclosure
Sound Reinforcement System	1	Microphones, receptacles, extension cables and stands
	2	Mixer/ pre-amp
	3	Equalizer
	4	Crossover network
	5	Amplifier
	6	speakers
	7	Equipment housing
	8	Cable
Athletic Field Sound	1	Microphones

Spec Section	#	Item Description
Augmentation System		
	2	Amplifiers / mixers
	3	Speakers & mounting brackets
	4	Equipment housing
	5	Cd players/mixers/compressors/power conditioners
	6	Cables / wall plates
Coaches' Communication Sys	1	Master station
	2	Headset 1 belt system
	3	Head coach switch module
	4	Extension cables
Television Distribution System	1	Block diagram of system showing catalog numbers of amplifiers, splitter, taps and cables
	2	Head end amplifiers
	3	Noise filters
	4	Pre-amplifiers, re-amplification and pads
	5	Coaxial cable
Media Management Center and Video Distribution	1	Internal control cabinet block diagram
	2	Wiring diagrams showing typical field wiring connections
	3	FCC registration number
	4	Data sheets for all equipment being provided
	5	Cable
Telecom Infrastructure	1	Cable trays and supports
	2	Fire wall penetrations
	3	Grounding equipment
	4	Hand Hole Boxes and Covers
	5	Cables
	6	Communication outlets
	7	Grounding equipment
Vibration & Seismic Control	1	Complete set of calcs and shop drawings with PE seal certifying that the design meets seismic req.
	2	Seismic design errors and omissions insurance certificate.

END OF SECTION **16050**

SECTION 16111 - CONDUIT

PART ONE - GENERAL:

1.01 Minimum size conduit shall be ½". Other sizes shall be as indicated on the Plans, or required by the National Electrical Code for number and size of conductors installed. All conduit joints shall be cut square, threaded, reamed smooth and drawn tight. Bends or offsets shall be made with standard conduit ells, field bends made with an approved bender or hickey, or hub-type conduit fittings. Number of bends per run shall conform to National Electrical Code limitations. All wiring, regardless of voltage, shall be in conduit.

PART TWO - PRODUCTS:

2.01 RIGID METAL CONDUIT (OR IMC):

A. Shall be used for:

1. Service.

2. Exposed branch circuits where subject to damage.

3. Branch circuits underground where outside of building line if not installed under 3" of concrete.

2.02 RIGID NONMETALIC CONDUIT (RNC):

A. Shall be used for:

1. Branch and feeder circuits underslab where inside of the building line (ground floor only).

2. Branch circuits underground where outside of the building line and below at least 3" of concrete or within duct banks

B. Shall be schedule 40 PVC.

2.03 PVC COATED RIGID GALVANIZED METAL CONDUIT

A. Shall be used for:

1. Corrosive exterior environments around cooling towers.

2.04 ELECTRICAL METALLIC TUBING (EMT):

A. Shall be used for:

1. All areas not listed in paragraphs 2.01, 2.02 and 2.03.

PART THREE - EXECUTION:

3.01 RACEWAYS:

A. Horizontal and vertical conduit runs may be supported by one hole malleable straps, clamp-backs or other approved devices with suitable bolts, expansion shields, or beam clamps for mounting to building structure or special brackets. Adjustable hangers may be used to suspend large conduits when separately located. If adjustable trapeze hangers are used to support groups of parallel conduits, U-bolt or similar type clamps shall be used at the end of a conduit run and at each elbow. J-bolts or approved clamps shall be installed on each third intermediate trapeze hanger to fasten each conduit. Hangers shall be painted with two coats of oil paint. Where excessive corrosive conditions are encountered, hanger assemblies shall be protected, after fabrication, by sheradizing or galvanizing, special paint, or other suitable preservative methods. The use of perforated iron straps, wire, etc., for supporting conduits will not be permitted. The required strength of the supporting equipment and the size and type of anchors shall be based on the combined weight of conduit, hanger, and cable.

B. Conduit installed in exterior wall shall be routed in stud or block cavity not in air spaces between block and brick.

C. Where any run of rigid conduit may change to a run of EMT, or vice-versa, such a change shall be made in a junction or outlet box, as elsewhere required, with each conduit terminating separately therein.

D. Conduit shall be continuous from outlet to outlet and from outlets to cabinets, pull boxes or junction boxes, and shall be secured to all boxes with locknuts and bushings in such a manner that each system shall be electrically continuous throughout. Conduit ends shall be capped to prevent entrance of foreign materials during construction.

E. Conduit terminals at cabinets and boxes shall be rigidly secured with locknuts and bushings as required by the National Electrical Code and other electrical codes. All conduit bushings shall be of the insulating type with two locknuts.

F. All conduit shall be installed complete before conductors are pulled in. All conduit shall be cleaned and free of foreign matter inside before any conductors are pulled in. A run of conduit which has become clogged shall be entirely freed, or shall be replaced.

G. A pullwire shall be left in each run of empty conduit. Pullwire shall be 16 gauge galvanized steel.

H. Run all conduit at right angles to or parallel to walls of building.

I. Use short pieces, approximately two feet, of flexible metal conduit to connect motors and other devices subject to motion and vibration.

J. Support conduit and secure to forms when cast in concrete so that conduit will not be displaced during pouring of concrete. Stuff boxes and cork fittings to prevent entrance of contaminants during concrete pouring and at other times during construction prior to completion of conduit installation.

K. Use expansion fittings with copper bonding jumpers to assure ground continuity across expansion joints in walls, floors, and ceilings. Use double locknuts and bushings on panel feeders at panel enclosures.

L. Install grounding bushing on all conduit entering or leaving main switchboard. Connect each bushing to switchboard ground bus with a separate #4 bare copper conductor, lugged to bus.

M. Any EMT connectors must be all steel compression type with insulated throat. EMT couplings shall be all steel compression type. No cast fittings of any type will be accepted.

N. Color coding shall be provided every 8'-0" on conduit or factory colored conduits shall be used and shall be as follows:

1. 480 volt, single and three phase - Orange
2. 208 volt, single and three phase - Green
3. 120 volt - Yellow
4. Fire alarm system - Red
5. Motor and other control systems - Blue
6. Telephone and communications - White
7. Security - Brown.

O. All firewall penetrations shall be properly fireproofed with U.L. listed system that conforms to the wall or floor type, wall or floor fire rating, and to the size and number of conduits penetrating the wall or floor.

P. Conduit shall not be routed within 1.5” of the underside of a corrugated metal roof deck and shall not be fastened to or supported from the underside of a corrugated metal roof deck.

Q. Underground conduits outside of the building line shall be installed as follows:

1. Conduits shall be a minimum of 30" below grade.

2. Rigid non-metallic conduit shall have an electronically detectable tracing tape installed above them.

3. Rigid non-metallic conduit bends shall be pre-manufactured “factory” bends or field made bends using “hot box” style conduit benders.

4. Rigid non-metallic conduit shall be installed below a minimum of 3" of concrete

5. Rigid non-metallic conduit joints shall be made per the manufacturer’s instructions including use of primer prior to application of glue.

R. Underground conduits inside of the building line shall be installed as follows:

1. Conduits shall be run under vapor barrier and shall be routed or shall be installed deep enough to prevent penetration of building footers or other structural supports.

2. Conduit shall have rigid steel 90's installed where penetrating slab. Rigid steel 90’s shall have two coats of asphaltum and all wrench marks and etc., shall be touched-up after conduit has been assembled.

3. Rigid non-metallic conduit joints shall be made per the manufacturer’s instructions including use of primer prior to application of glue.

S. Conduits shall not be installed within the concrete slabs of intermediate floor levels.

T. Conduits which are subjected to large temperature differences or those which enter the building from the exterior shall be sealed. The sealing method shall be equal to poly water FST. Conduits to be sealed include:

1. Those which enter the building from the exterior.

2. Those which enter coolers or freezers.

3. Those which pass through unconditioned portion of the building.

4. Those which supply rooftop equipment.

U. Conduits shall not be installed above or on top of a roof without expressed permission of the engineer. Conduits serving rooftop equipment shall be routed within the building and penetrate the roof plane vertically at the equipment being supplied.

V. Conduits installed in masonry construction shall be routed vertically in block cavities. They shall not be routed horizontally for more than 24” within block wall where such

installation requires excessive cutting or notching of each block.

W. Where surface mounted conduits are permitted, they shall be painted to match the adjacent wall surfaces.

X. Bridging between steel joist framing shall not be used to support conduits.

Y. Parallel sets of conductors routed below grade shall be installed in duct banks.

1. Duct bank shall be encased in concrete with at least three inches of concrete at the top and bottom and two inches on each side. A horizontal and vertical separation between the ducts of 3 inches shall be maintained by installing thermoplastic high impact spacers at 4 foot intervals. Spacers shall be equal to Carlon #SPxW30-2.

2. Stagger the joints of the conduits by rows and layers so as to provide a duct line having the maximum strength.

3. During construction, protect partially completed duct lines from the entrance of debris such as mud, sand and dirt by means of suitable conduit plugs.

4. As each section of a duct line is completed, draw a testing mandrel not less than 12 inches long with a diameter 1/4 inch less than the size of the conduit through each conduit, after which draw a brush having the diameter of the conduit, and having still bristles through until the conduit is clear of all particles of earth, sand, and/or gravel; then immediately install conduit plugs.

5. Conduits shall be sized as indicated on project drawings. Provide steel reinforcing in concrete duct bank as indicated on drawings. Separate conduit as indicated.

6.) Install the top of the concrete envelope not less than 30 inches below grade or as indicated on project Drawings.

Z. Concrete used to cover below grade conduits shall be 3000 psi concrete with 1 inch maximum aggregate

END OF SECTION 16111

SECTION 16120 - WIRES AND CABLES

PART ONE - GENERAL:

1.01 CONDUCTORS:

A. Provide soft-drawn copper conductors in raceways as shown on Drawings. Conductors shall conform to the latest NEC requirements and meet ASTM specifications, with 75/90 degree C, Type THWN/THHN insulation.

B. All wire and cable shall be new, with size, grade of insulation, voltage and manufacturer's name permanently imprinted on outer covering at regular intervals, and delivered to the job site in complete coils and reels. All wires sized #10 and smaller shall be solid, and sizes #8 and larger shall be stranded.

1.02 COLOR CODING:

A. Wire and cable shall have colored insulation in sizes #10 and smaller; and in sizes #8 and larger shall be color coded on the job using Scotch color tape, E-Z code, Brady, or equal wire markers. Color coding shall be as follows:

240 DELTA/120 or 208 WYE/120 VOLT SYSTEM	480 WYE/277 VOLT SYSTEM
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Neutral - White	Neutral - Gray
Grounding - Green	

*Provide permanent identification of color coding in each branch circuit panelboard as per NEC.

PART TWO - PRODUCTS:

2.01 CONDUCTORS:

A. Wire and cable shall be as manufactured by Colonial Wire & Cable, Essex, Southwire Co., General Cable, Rome Cable, or approved equal.

2.02 CONNECTORS:

A. Connectors, lugs, and terminals, shall be as manufactured by 3M Company, Ideal, Anderson, Thomas & Betts, OZ Electrical Mfg. Co., or approved equal.

PART THREE - EXECUTION:

3.01 CONDUCTORS:

A. Minimum wire size for all branch circuits shall be #12 except where indicated otherwise. If the distance from the panelboards to the first outlet exceeds 50 ft., the minimum size conductor for this run shall be #10. If the distance from the panelboards to the first outlet exceeds 100 ft., the minimum size conductor for this run shall be #8. If in special cases this distance must be exceeded, larger conductors of sizes noted on the plans shall be installed.

B. Do not pull conductors before completion of masonry, concrete, and other trades which generate dust and debris.

C. Wire and cables shall be suitably protected from weather during storage and handling and shall be in good condition when installed.

3.02 TERMINATIONS:

A. Conductors #8 and larger shall be connected to equipment by means of pressure type mechanical lugs. Where multiple conductors are connected to the same terminal, each conductor shall be provided with an individual lug.

B. Solderless connectors of the proper type shall be used for all wiring connections. Where compression type connectors are noted on the plans and in the specifications, they shall be installed with approved hydraulic tools to assure a permanent, mechanically secure, high-conductivity joint. Where soldered joints are specified, the cable joint shall be mechanically strong before soldering. Solder shall be carefully applied without use of acid. Soldered connection shall be wrapped with rubber and friction or insulating plastic tape in a manner approved for circuit voltage.

3.03 TAPS AND SPLICES:

A. All cable taps, and splices shall be made secure with solderless pressure type connectors, unless otherwise specified. Where compression type connectors are noted on the plans and in the specifications, they shall be installed with approved hydraulic tools to assure a permanent, mechanically secure, high-conductivity joint. Where soldered joints are specified, the cable joint shall be mechanically strong before soldering. Solder shall be carefully applied without use of acid. Soldered connection shall be wrapped with rubber and friction or insulating plastic tape in a manner approved for circuit voltage.

B. All high-voltage conductor and cable splices, connections, and terminations shall be made with termination or splicing kits containing the necessary connectors and insulating materials for the

specific cable size and type involved.

C. Where conductors are to be connected to metallic surfaces, the coated surfaces of the metal shall be polished before installing the connector. Lacquer coating of conduits shall be removed where ground clamps are to be installed.

D. Join conductors with twist on wire connectors sized for the number and gauge of conductors or by soldering, brazing, or welding. Tape all soldered or brazed connections or cover with approved prefabricated insulating devices to provide insulation resistance at the connection equal to that of the wire. Make splices in boxes or fittings only. Push in type wire connectors shall not be used.

3.04 INSULATION RESISTANCE TESTING

A. All panel board and switchboard feeders shall be tested prior to energizing. 480V feeders shall be tested at 1000 VDC, 208V and 240V feeders shall be tested at 500 VDC.

B. All current carrying and neutral conductors in every set of conductors shall be tested. Each current carrying and neutral conductor shall be tested to ground and to each other.

C. All resistance measurements shall be recorded after 60 seconds and all measurements shall be temperature corrected to 60 degrees F.

D. For each test measurement, the electrical contractor shall record the following information: Project name, date, temperature, humidity, testers name, testing device manufacturer and model number, feeder origin and termination points, test voltage, set number (for parallel feeders), conductor length, conductor size, measurement origin and termination (for example “A phase to ground “or” A phase to B phase”), insulation resistance in meg-ohms per foot at 60 degrees F, and the signature of the tester. A sample form is attached and a spreadsheet which calculates the corrected insulation readings in meg-ohms per foot at 60 degrees F is available from the engineer.

E. All feeder insulation resistance measurements shall be forwarded to the engineer for review prior to energizing of the feeder. Copies shall also be collected into a binder and submitted to the owner as part of the operations and maintenance (O & M) documentation.

F. Cables with an insulation resistance measurement corrected to 60 degrees F, which is less than 2 meg-ohms per foot shall be replaced by the electrical contractor at no additional cost to the owner.

END OF SECTION 16120

MECHANICAL AND ROOFING RENOVATIONS TO ST. JAMES MIDDLE SCHOOL

Project Name			**Tester's Name**		
Test Date			**Tester's Signature**		
Test Voltage (use 1000 volts for 480V, 500 volts for 208 /240V)		Volts DC	**Testing Device (Make & Model)**		
Feeder Origin			**Feeder Destination**		
Feeder Operating Voltage		Volts	**Feeder Length**		Feet
Temperature		Degree F	**Humidity**		% RH

	MEASURED INSULATION READING (in Meg Ohms at ambient temperature)													
Set #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
A TO B														
A TO C														
B TO C														
A TO N														
B TO N														
C TO N														
A TO G														
B TO G														
C TO G														
N TO G														

	CORRECTED INSULATION READING (Meg Ohms/ft at 60 deg F temperature)													
Set #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
A TO B														
A TO C														
B TO C														
A TO N														
B TO N														

MECHANICAL AND ROOFING RENOVATIONS TO ST. JAMES MIDDLE SCHOOL

C TO N														
A TO G														
B TO G														
C TO G														
N TO G														

SECTION 16160 - PANELBOARDS

PART ONE - GENERAL:

1.01. Description of Work

A. Where shown on the plans, indicated in the riser diagram, or listed in the panelboard schedule, furnish and install power, distribution, and lighting panels of the size and type indicated.

1.02. Submittal Requirements

A. Where indicated on the plans, manufacture shall furnish a selective coordination report with the product submittal. This report shall include all of the time current curves for all of the overcurrent devices in the indicated system.

1.03. Basis of Design

A. The overcurrent protection system basis of design is GE. Any changes necessary to achieve selective coordination of other approved manufacturer's equipment shall be the sole responsibility of the electrical contractor.

PART TWO - PRODUCTS:

2.01. Manufacturers

A. Panelboards shall be manufactured by General Electric, Square D, Siemens, Cutler Hammer, or prior approved equal.

2.02. Materials and Components

A. Distribution and power panelboards shall be of the dead-front safety type, equipped with thermal-magnetic circuit-breaker branches of sizes and types noted on the Drawings or indicated in the panelboard schedule. Breakers shall provide instantaneous trip on short circuits and time-delay trip on overloads. Main busbars shall be equipped with solderless lugs and all spaces shall be bussed. Panelboard assembly shall be enclosed in a code - gauge steel cabinet with ample wiring gutters on top, sides, and bottom. Cabinet doors shall be equipped with spring latches with locks and shall be keyed alike.

B. Lighting panelboards shall be of the circuit breaker type of sizes listed in the panelboard schedule or noted on the Drawings. The panels shall have mains only with solderless lugs on the main busbars. Branches shall have circuit breakers of the sizes indicated on the panel schedule. Cabinets shall be of the code - gauge steel with ample wiring gutters for all wires and connections. Doors shall be the single type with spring latches with locks and all keyed alike.

C. Unless otherwise indicated on the drawings, all panelboards shall have a fully rated symmetrical short circuit fault current rating of at least 22,000 amperes. Series rated

panels are not acceptable.

D. All panelboards shall have bolt on breakers. Plug in breakers are not acceptable.

E. Circuit breakers shall be 20-amp, 1 pole unless indicated otherwise.

F. Panels shall be 17" minimum width.

G. Surface Mounted panels which are noted elsewhere in these contract documents to have TVSS/SPD protection shall have TVSS/SPD units mounted adjacent to the panels. See the details and other specifications for more details.

H. Flush mounted panels which are noted elsewhere in these contract documents to have TVSS/SPD protection shall have integral units with Performance characteristics as close as possible to the external units. Integral TVSS/SPD units shall be furnished by the panelboard manufacturer.

PART THREE - EXECUTION:

3.01. Installation

A. From each flush mounted panelboard, stub a minimum of five one inch empty conduits into area above ceiling.

B. Install in each panelboard a plastic-covered typewritten circuit directory in metal frame. Indicate name, address and service telephone number of installer. Directory shall list the load served and the location of the load for each breaker. Directory shall indicate the final room numbers designated by the owner and not necessary those shown by the architect on the floor plans.

C. All multiwire branch circuits shall have a handle tie supplied by the panel board manufacture installed to simultaneously open all ungrounded conductors. The electrical contractor may substitute multi pole breakers for this purpose at his discretion. All conductors that comprise the multiwire branch circuit shall be bundled and tye-wrapped together at the point where they enter the panel.

D. Electrical contractor shall furnish and install leak protection pans under all non-electrical system piping which passes over electrical panels and pitch pan to drain away from electrical equipment.

E. The electrical contractor shall apply warning label which states “Warning arc flash hazard appropriate PPE required”. The warning label design shall comply with ANSI Z535.4

F. Except where existing panels are being replaced, conductors shall not be spliced within a panel or pass through a panel. Conductors shall be neatly routed within the panel and excess wiring shall be removed.

3.02 NAMEPLATES:

A. On all panelboards, provide engraved phenolic plastic nameplates. Unless otherwise noted, nameplates to be 1/16" thick plastic with 1/4" high white letters on black background. Hand lettering, typing under tape, embossed letters on plastic, etc., will not be acceptable.

B. Attach nameplates with two rivets.

C. Label shall indicate, panel name, suppling panel or transformer, voltage and phasing similar to:

PANEL PA1
120/208 VOLTS / 3 PHASE
SUPPLIED FROM 45 KVA
TRANSFORMER T1

END OF SECTION 16160

SECTION 16161 - FUSES

PART ONE - GENERAL:

1.01 MATERIALS AND COMPONENTS:

A. Fuses shall be listed and meet UL and/or NEMA Standards for Class K5, J, L, and RKI fuses, or as indicated on the drawings.

B. Where fuses are required elsewhere in the specifications or on the drawings for individual motor circuit protection, for motor control centers, and for motor starters, these fuses shall be class K5 fuses unless otherwise indicated. Class K5 fuses shall be dual element cartridge design with high interrupting capacity, current limiting effect, 200,000 ampere RMS symmetrical at rated voltage minimum, and a minimum time delay of ten (10) seconds at five hundred percent (500%) load.

C. Class J and L fuses shall be provided as indicated on the Drawings for protection of non-motor loads.

D. Fuse voltage rating shall be 250 volts for 120/208 volt system and 480 or 600 volts for 277/480 volt system.

1.02 SPARE FUSE CABINET

A. All spare fuses shall be stored in their original cartons in a spare fuse cabinet furnished and installed by the electrical contractor. The cabinet shall be steel, surface mounted, with a hinged door, phenolic “Spare Fuse” label, flush lock, finished with gray baked enamel, and sized as required to house all spare fuses. A directory listing type and location of each fuse shall be mounted on the inside of the door. Spare fuse cabinet shall be similar to BUSSMAN Cat. No. SFC.

B, The spare fuse cabinet shall be wall mounted within sight of the main service panel or switchboard.

PART TWO - PRODUCTS:

2.01 FUSES:

A. Fuses shall be as manufactured by BUSSMAN or GOULD SHAWMUT.

B. Fuses over 600 amps up to 6,000 amps shall be UL Class ‘L’ time-delay fuses equal to BUSSMAN “HI-CAP” KRP-C. The fuses shall hold five hundred percent (500%) of rated current for a minimum of four (4) seconds and clear twenty (20) times rated current in 0.01

seconds or less.

C. Fuses up to 600 amps used for service entrance equipment shall be UL Class RKI dual-element fuses equal to BUSSMAN "LOW-PEAK" LPN-RK for 250 volts or LPS-RK for 600 volts. The fuses shall hold five hundred percent (500%) of rated current for a minimum of ten (10) seconds.

D. Fuses protecting other than service entrance equipment rated over 100 amps up to 600 amps shall be UL Class K5 dual-element fuses equal to BUSSMAN "FUSETRON" FRN-R for 250 volts or FRS-R for 600 volts unless otherwise noted on the Drawings.

E. Fuses 100 amps and under shall be UL Class K5 dual-element fuses equal to BUSSMAN "FUSETRON" FRN-R for 250 volts or FREER for 600 volts unless otherwise noted on the Drawings.

PART THREE - EXECUTION:

3.01 FUSES;

A. The electrical contractor shall furnish and install fuses for all switches, switchboards, distribution panel, or any other electrical equipment furnished under this division of these specifications requiring fuses.

B. The electrical contractor shall furnish one additional set of each type and rating of fuse as spare as well as any required puller or installation devices. These shall be installed in the original boxes in the spare fuse cabinet.

C. The electrical contractor shall provide a chart listing fuse ampacity, type and manufacturer's part number installed in each disconnect. A copy shall of this chart shall be collected into a binder and submitted to the owner as part of the operations and maintenance (O & M) documentation.

END OF SECTION 16161

SECTION 16170 - MOTOR AND CIRCUIT DISCONNECTS

PART ONE - GENERAL:

1.01 Furnish and install heavy-duty disconnect switches at locations shown on Drawings, and in accordance with NEC requirements. Operating mechanisms shall be the quick-make, quick-break type, with arc-suppressing characteristics. Enclosures shall be NEMA Type 1 indoors and NEMA Type 3R in outdoor and wet locations; equipped with cover interlock and provisions for padlocking operating handle in "ON" and "OFF" position.

1.02 Fuses shall be Gould Shawmut or Bussmann. Spare fuse cabinet shall be wall mounted with shelves suitable size to store spare fuses and fuse pullers specified. One additional set of each type/rating of fuse shall be included as spare.

PART TWO - PRODUCTS:

2.01 Safety switches shall be by the same manufacturer as panelboards.

PART THREE – EXECUTION

3.02 NAMEPLATES:

A. On all disconnects, provide engraved phenolic plastic nameplates. Unless otherwise noted, nameplates to be 1/16" thick plastic with 1/4" high white letters on black background. Hand lettering, typing under tape, embossed letters on plastic, etc., will not be acceptable.

B. Attach nameplates with two rivets.

C. Label shall indicate, load served, suppling panel and breaker, voltage and phasing similar to:

AHU #1A
120/208 VOLTS / 3 PHASE
SUPPLIED FROM
PANEL PA1 CIRCUIT 32

END OF SECTION 16170

Engineer of Record:

Owen's & Associates, LLC

1007 Lake Hunter Circle

Mt. Pleasant, South Carolina 29464

Phone: 843/849-6457

Roof Consultant:

Shepard & Associates, LLC

3547 Dreher Shoals Road, Suite 6

Irmo, South Carolina 29063

Phone: 803/407-8284

Fax: 803/407-8206

Owner:

Horry County School District

335 Four Mile Road

Conway, SC 29526

Horry County Schools

A PROJECT MANUAL FOR THE ROOFING AND HVAC REPLACEMENT PROJECT AT ST. JAMES MIDDLE SCHOOL

DECEMBER 2021

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December 2021
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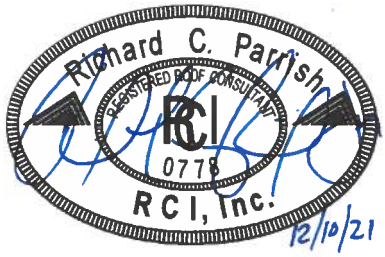

ROOFING AND HVAC REPLACEMENT
PROJECT AT ST JAMES MIDDLE SCHOOL

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TABLE OF CONTENTS

NOTE: The pages of each specification section are numbered independently for each section and the total number of pages for each section is recorded in this Table of Contents. Each Section is concluded with an End of Section statement. It shall be the Contractor's responsibility to verify that specifications received for bidding and/or construction are complete in accordance with this Table of Contents; no additional compensation will be allowed the Contractor due to belated discovery of missing pages.

END OF TABLE OF CONTENTS

AIA DOCUMENT A701-2018 INSTRUCTIONS TO BIDDERS IS A PART OF THESE BID DOCUMENTS AS IF PRINTED HEREIN IN ITS ENTIRETY. DOCUMENT IS AVAILABLE FOR REVIEW AT THE OFFICE OF

Shepard & Associates, LLC
3547 Dreher Shoals Road, Suite 6
Irmo, SC 29063
803-407-8284

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS
GENERAL CONDITIONS
INCORPORATION OF DOCUMENTS

The "Instructions to Bidders," American Institute of Architects Document A701, 2018 Edition, Article 1 through 8 inclusive is a part of this Project Manual and is referenced to herein as the Instructions to Bidders.

EFFECT OF SUPPLEMENTARY INSTRUCTIONS

The following supplements modify, delete from, or add to, the INSTRUCTIONS TO BIDDERS. Where any article, paragraph or subparagraph in the INSTRUCTIONS TO BIDDERS is supplemented by one of the following paragraphs, the provisions of such article, paragraph or subparagraph shall remain in effect and the supplemental provisions shall be considered as added thereto. Where any article, paragraph or subparagraph in the INSTRUCTIONS TO BIDDERS is amended, voided or superseded by any of the following paragraphs, the provisions of such article, paragraph or subparagraph not so amended, voided or superseded shall remain in effect.

ARTICLE 1- DEFINITIONS

1.10 Wherever the word "ARCHITECT" appears in the INSTRUCTIONS TO BIDDERS substitute therefore "ARCHITECT/ENGINEER" ("A/E").

ARTICLE 2 - BIDDER'S REPRESENTATIONS

Add the following:

2.1.4 Bidder has secured on-site measurements for quantities upon which Bidder's proposal is based and has observed all existing conditions and limitations.

ARTICLE 3 - BIDDING DOCUMENTS

Add the following:

3.2.4 The organization of the Specifications into divisions, sections and articles and the arrangement of Drawings shall not control the Bidder in dividing the Work among sub-bidders or in establishing the extent of Work to be performed by any trade.

3.2.5 This Project Manual is, in part, of the "streamlined" type and includes incomplete sentences. Omissions of words or phrases such as "the Contractor shall," "as noted on the drawings" "according to the plans "a," "an", "all," are intentional and shall be supplied by inference by the reader. Words "shall" or "shall be" shall be supplied by inference where a colon (:) is used within a sentence or phrase. Where a manufacturer's name is mentioned, the words "as manufactured by" or "as made by" shall be understood.

3.2.6 A Pre-Bid Conference will be held for purposes of considering questions posed by Bidders as follows.

TIME: See Invitation to Bid
PLACE: See Invitation to Bid

3.2.6.1 All interpretations and corrections of Bidding Documents deriving from this Conference will be included in an addendum.

3.3.2 After “Architect’s”, in last sentence, add “and Owner’s”.

3.3.3 After “Architect”, add “and Owner approve”.

ARTICLE 4 - BIDDING PROCEDURE

4.2.1 Delete entire paragraph and replace with the following:

"Each Bid shall be accompanied by a bid security in the amount required by the Advertisement or Invitation to Bid pledging that Bidder will enter into a Contract with the Owner on the terms stated in this Bid and will, if required, furnish bonds as described hereunder in Article 7 governing the faithful performance of the Contract and the payment of all obligations arising there-under. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty".

Add the following:

4.2.4 Bid Bonds and checks will be returned to all except the three lowest bidders within ten (10) days after the formal opening of bids. The bid bond or check of the three lowest bidders will be returned within 48 hours after the Owner and Contractor have executed a Contract and the executed performance bond and payment bond has been approved by the Owner, or, if no award has been made within 60 days after the opening of bids, upon the demand of the bidder at any time thereafter, so long as he has not been notified of the acceptance of this bid.

Add the following:

4.3.1.1 South Carolina Bidder's License and Contractor's License Numbers if required should be shown on the outside of the bid envelope.

ARTICLE 5 - CONSIDERATION OF BIDS

Add the following:

5.2.1 The Owner reserves the right to disqualify bids, before or after opening, upon evidence of collusion with intent to defraud or other illegal practices upon the part of the Bidder.

ARTICLE 6 - POST-BID INFORMATION

6.2 Delete entire paragraph.

Add the following:

6.3.5 At or before delivery of signed agreement, Bidder shall deliver to Owner the policies of insurance or certificates.

ARTICLE 7 - TIME OF DELIVERY AND FORM OF BONDS

Change Paragraph 7.2.1 to read:

7.2.1 The Bidder shall deliver the required bonds to the Owner, prior to signing of the contract.

Change 7.2.3 to read:

7.2.3 The bonds shall be dated on or before the date of the contract.

Add the following:

ARTICLE 9 - CONTRACTOR'S LICENSES

9.1 Each bidder (should his bid exceed $5,000) shall obtain a Contractor's License under the provisions of the Contractor's Licensing Law (1976 Code) Volume 14, Chapter 11, Section 40-11-10 through 40-11-340 as amended. Specialty Contractor's Licenses can be obtained for the various building trades and information regarding these licenses can be obtained from the South Carolina Licensing Board for Contractors. It shall be the bidder's responsibility to provide appropriate licensing to perform the work described in the contract documents.

9.1.2 Any Owner hiring or contracting or having a Contract with any non-resident Contractor, where such contract exceeds $10,000 or can be expected to exceed that amount, shall be required by law to withhold two percent (2%) of each and every payment made after January 1, 1959, to such non-resident individuals and partnerships, and foreign corporations as well.

9.1.3 If a Contractor has any employees earning income in South Carolina who are legal residents of another state, he also becomes a withholding agent and must withhold South Carolina Income Taxes from the earnings of the non-resident employees on the basis of tables furnished by the South Carolina Tax Commission. If a Contractor subcontracts with other non-resident Contractors, he must withhold two percent (2%) of each and every payment made to the subcontractor if the total amount of the subcontract exceeds $10,000 or can be expected to exceed that amount. The subcontractor may obtain in the same relief as a Contractor by posting bond, per stipulations of this Act.

9.2 EXISTING UTILITIES

Each Contractor shall be responsible for the protection of underground and overhead utilities in the work area which are shown on the Drawings and/or which can be detected by a visual inspection of the job site. Each Contractor is cautioned, however, that there may exist unknown underground utilities neither visible nor shown on the Drawings. Each Contractor will take all reasonable precautions necessary to detect and preserve the services that these utilities provide. It shall be the responsibility of the Contractor to contact a utility locator service to have all utilities marked prior to commencement of work. Should additional work be caused to the Contractor by the presence of such unknown underground utilities, the cost borne by the Contractor as a result of same shall be reimbursed by the Owner through the use of a negotiated change order. Should any utility interruptions occur, the Contractor shall immediately restore these same utilities to prevent further damages or Owner inconveniences.

9.3 EXCESS EXCAVATED MATERIALS

The bidder is responsible for removing from the site all excess or unsuitable excavated material generated by these activities unless specifically provided for in the Drawings and Specifications or approved by the Program Manager.

9.4 PROHIBITION AGAINST GRATUITIES, ETC.

The Contractor's attention is directed to Section 8-13-420 of the South Carolina Code of Laws, 1976 as amended regarding the prohibition against gratuities and kickbacks, etc.

9.5 ACCESS TO PROJECT

The successful bidder will not be permitted to occupy the site of the Work or allowed on the property of the Owner until insurance and bond requirements have been accepted and approved and the written Notice to Proceed has been issued.

END OF SECTION 00700

BID FORM

PROJECT IDENTIFICATION: **ROOFING AND HVAC REPLACEMENT PROJECT AT ST JAMES MIDDLE SCHOOL**

BID SUBMITTED TO: Horry County School District
335 Four Mile Road
Conway, SC 29526

BID SUBMITTED FROM: _____

_____

_____

_____

1. The undersigned BIDDER agrees, if this Bid is accepted, to enter into an agreement with OWNER, in the form included in the Bidding Documents, to perform and furnish the Work as specified or indicated in the Bidding Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

    a. This Bid will remain subject to acceptance for 60 calendar days after the day of Bid opening;
    b. The Owner has the right to reject this Bid;
    c. BIDDER accepts the provisions of the Instructions and Supplementary Instructions to Bidders regarding disposition of Bid Security;
    d. BIDDER has examined copies of all the Bidding Documents, Drawings, and Specifications prepared by Shepard & Associates LLC, dated December 2021.
    e. BIDDER has visited the site and become familiar with the general, local, and site conditions;
    f. BIDDER is familiar with federal, state, and local laws and regulations;
    g. BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Bidding Documents, and additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;
    h. This Bid is genuine and not made in the interest of or on behalf of an undisclosed person, firm, or corporation and is not submitted in conformity with an agreement or rules of a group, association, organization, or corporation; BIDDER has not directly or indirectly induced or solicited another Bidder to submit a false or sham Bid; BIDDER has not solicited or induced a person, firm, or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself an advantage over another BIDDER or over OWNER.
    i. The BIDDER certifies that it will provide a “Drug-Free Workplace” as that term is defined in Section 44-107-30 of the SC Code of Laws and shall comply with the requirements set forth is Title 44, Chapter 107.

j. The BIDDER certifies that it is in compliance with the "SC Illegal Immigration Reform Act of 2008" as defined in Title 8, Chapter 14 of the South Carolina Code of Laws and agrees to provide to the State upon written request any documentation required to establish that you and your subcontractors or sub-subcontractors are in compliance with Title 8, Chapter 14.

k. BIDDER has received the following Addenda, receipt of which is hereby acknowledged;

NUMBER	DATE	NO. OF PAGES

3. PRICES:

BASE BID ROOFING WORK:

3.1.1 Roof Areas 16, 17, 18, 19, 20, 21, 22, 23, 24, C1, C2 & C3 (Approximately 40,728 SF): The work generally consists of the complete removal and disposal of the existing: aggregate surfaced Built-Up Roofing assembly down to the surface of the existing metal and cementitious wood fiber decking, metal through wall scupper liners, coping cap, gutters and downspouts on RA 24, and metal and bituminous flashings;

Preparations include, but are not limited to: the removal and replacement of damaged or deteriorated metal and cementitious wood fiber decking, wire brushing, and painting oxidized existing metal decking to receive new Roofing Assembly, install new wood blocking at perimeters, raising expansion joints, equipment curbs and sanitary vents, as necessary; disconnecting, raising and reconnecting existing gas piping and curb mounted rooftop equipment; wire brush, prime and paint existing gas piping on all roof areas and roof hatches

and the new installation of: wood blocking, ½" fire rated gypsum thermal barrier, and flat and tapered expanded polystyrene insulation, and a 1/4" cover board mechanically attached to the deck, two-ply modified asphalt roofing system with a cool roof cap sheet surfacing in cold adhesive, metal, bituminous, and liquid applied flashings, metal copings, gutter and downspouts, expansion joint flashings; overflow scupper liners, walk pads, gas pipe supports, condensate drain piping and supports, new metal splash blocks, new wall mounted ladders, and miscellaneous work, as specified herein.

BIDDER will complete the Work in accordance with the Contract Documents for the following price:

LUMP SUM BASE BID: $ _____ LS

ALTERNATE BID No 1 WORK:

3.1.2 Roof Areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 & 15 (Approximately 99,786 SF): The work generally consists of the complete removal and disposal of the existing Modified Bitumen Roofing assembly down to the surface of the existing metal and cementitious wood fiber decking, metal through wall scupper liners, coping cap, gutters and downspouts on RA 24, and metal and bituminous flashings;

Preparations include, but are not limited to: the removal and replacement of damaged or deteriorated metal and cementitious wood fiber decking; wire brushing, and painting oxidized existing metal decking to receive new Roofing Assembly, install new wood blocking at perimeters, raising expansion joints, equipment curbs and sanitary vents, as necessary; disconnecting, raising and reconnecting existing gas piping and curb mounted rooftop equipment; wire brush, prime and paint existing gas piping on all roof areas and roof hatches

and the new installation of: wood blocking, ½" fire rated gypsum thermal barrier, and flat and tapered expanded polystyrene insulation, and a 1/4" cover board mechanically attached to the deck, two-ply modified asphalt roofing system with a cool roof cap sheet surfacing in cold adhesive, metal, bituminous, and liquid applied flashings, metal copings, gutter and downspouts, expansion joint flashings; overflow scupper liners, walk pads, gas pipe supports, condensate drain piping and supports, new metal splash blocks, new wall mounted ladders, and miscellaneous work, as specified herein

BIDDER will complete the Work in accordance with the Contract Documents for the following price:

LUMP SUM ALTERNATE BID No 1: $ _____ LS

ALTERNATE BID No 2 WORK:

3.1.3 Roof Areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 & 15 (Approximately 99,786 SF): The work generally consists of the complete removal and disposal of the existing bituminous and metal flashings, gutters and downspouts on RA 6, coping, expansion joint covers, and removal and disposal of abandoned equipment curbs;

Preparations include, but are not limited to: cutting out and replacing membrane at blisters in existing membrane, installation of new wood blocking at perimeters, raising expansion joints, equipment curbs and sanitary vents, as necessary; disconnecting, raising and reconnecting existing gas piping and curb mounted rooftop equipment; installation of drain bowl extensions at main roof drains; wire brush, prime and paint existing gas piping on all roof areas and roof hatches

and the new installation of: wood blocking, a 1/2" cover board mechanically

attached, two-ply modified asphalt roofing system with a cool roof cap sheet surfacing in cold adhesive, metal, bituminous, and liquid applied flashings, metal copings, gutter and downspouts, expansion joint flashings; overflow scupper liners, walk pads, gas pipe supports, condensate drain piping and supports, new metal splash blocks, new wall mounted ladders, and miscellaneous work, as specified herein.

BIDDER will complete the Work in accordance with the Contract Documents for the following price:

LUMP SUM ALTERNATE BID No 2: $ _____ LS

ALTERNATE BID No 3 WORK:

3.1.4 Roof Areas 11, 14, 15, 16, 17, 18, 19, 23 (Locations of Equipment Screens and Wall Panels): The work generally consists of the removal of any loose or flaking paint, rust, or other surface contaminates;

Preparations include, but are not limited to: Preparing metal mechanical screens and wall panels to receive new paint that matches new sheet metal;

and the application of new primer and paint over the prepared wall panels and metal mechanical screens.

BIDDER will complete the Work in accordance with the Contract Documents for the following price:

LUMP SUM ALTERNATE BID No 3: $ _____ LS

4. UNIT PRICES

Provide UNIT PRICES for only the items listed. The UNIT PRICES shall indicate the amount to be added to or deducted from the Contract sum for each item. Unit Prices shall include all costs including charges for materials, labor (removals and installation), equipment, fees, taxes, insurance, bonding, overhead, profit, etc. The Owner reserves the right to include or not include any of the following UNIT PRICES in the Contract.

No.	ITEM	UNIT	COST to ADD or DEDUCT (one price)
1.	Removal and replacement of any damaged or deteriorated wood blocking.	Board Foot	_____
2.	Steel Decking Cleaning and Priming	Square Foot	_____
3.	Steel Decking Replacement	Square Foot	_____
4.	Cementitious Wood Fiber Deck	Square Foot	_____

5. SUBCONTRACTS

We (do) (do not) intend to subcontract certain items of work on this project.

ITEMS TO BE SUBCONTRACTED	SUBCONTRACTOR	LOCATION

6. COMPLETION DATE

Scheduling and speed of construction are of prime importance in the completion of the Work. Demolition, Preparation and New Construction shall commence as established in the Notice to Proceed. BIDDER agrees that the BASE BID WORK & AWARDED ALTERNATES will be substantially complete and ready for final payment in accordance with the General Conditions within 250 calendar days after Notice to Proceed. BIDDER acknowledges that in case of inclement weather during normal workdays, weekend work may be required to complete the Work within the allotted time.

7. LIQUIDATED DAMAGES

Liquidated Damages will be assessed in the amount of $500.00 for each calendar day the actual Contract Time for Substantial Completion exceeds the specified Contract Time.

Liquidated Damages will be assessed in the amount of $500.00 for each calendar day the actual Contract Time for Final Completion exceeds 30 days following Date of Substantial Completion.

8. ATTACHMENTS

The following documents are attached to and made a condition of this Bid:

(a) Required Bid Security with Power of Attorney

(b) Executed SLED Background Check and National Sexual Predator Database Requirements (Attached)

SLED Background Check Requirements

All individuals who the individual or company anticipates working in the after-school program must be cleared through a SLED check to be authorized to be around children in the school. The individual or company offered a contract will be responsible for providing proof of a proper SLED background report for those who work in the after-school program associated with the company or individual.

National Sexual Predator Database Requirements

Contractor/Subcontractors must stipulate that they are responsible for running a National Sex Offender Registry check on their employees who work in schools.

By signing below, the bidder agrees to prohibit any employees or sub-contractor employees from performing work or services at Horry County School District if they are deemed to be Registered Sex Offenders or pose a known criminal danger to children or staff. The vendor hereby agrees to run a National Sex Offender Registry check (http://www.nsopr.gov/) or equivalent on all employees or sub-contractor employees who may be in the proximity of school children or staff. This check must be done by the vendor prior to performing any work or services at Horry County School District facilities.

Authorized Signature: _____ *Date:* _____

SUBMITTED on _____, 20____.

We operate as a corporation incorporated in the State of _____

We operate as a co-partnership:
Name of Partners: _____

_____

I operate as an individual doing business under the trade name of:

_____

My South Carolina Number is: Contractor's No. _____

CONTRACTOR:_____

WITNESS: SIGNED: _____

_____ TYPED NAME:_____

TITLE:_____

TELEPHONE NUMBER:_____

If Contractor is a Corporation:

ATTEST: _____

TYPED NAME: _____

SECRETARY: _____

CORPORATE SEAL:

END OF BID FORM

AIA DOCUMENT A101-2017
STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR IS A PART OF THESE BID DOCUMENTS AS IF PRINTED HEREIN IN ITS ENTIRETY. DOCUMENT IS AVAILABLE FOR REVIEW AT THE OFFICE OF

Shepard & Associates, LLC
3547 Dreher Shoals Road, Suite 6
Irmo, SC 29063
803-407-8284

AIA DOCUMENT A201-2017
GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION IS A PART OF THESE BID DOCUMENTS AS IF PRINTED HEREIN IN ITS ENTIRETY. DOCUMENT IS AVAILABLE FOR REVIEW AT THE OFFICE OF

Shepard & Associates, LLC
3547 Dreher Shoals Road, Suite 6
Irmo, SC 29063
803-407-8284

HORRY COUNTY SCHOOL DISTRICT

ROOFING AND HVAC REPLACEMENT
PROJECT AT ST JAMES MIDDLE SCHOOL

SUPPLEMENTARY CONDITIONS TO THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION
A201 (2017 EDITION)

GENERAL CONDITIONS

INCORPORATION OF DOCUMENTS

The "General Conditions of the Contract for Construction," AIA Document A201, 2017 Edition, Articles 1 through 15 inclusive, is part of this Contract and is hereinafter referred to as "GENERAL CONDITIONS."

EFFECT OF SUPPLEMENTARY CONDITIONS

The following supplementary conditions modify, delete and/or add to the GENERAL CONDITIONS. Where any article, paragraph, or subparagraph in the GENERAL CONDITIONS is supplemented by one of the following paragraphs, the provisions of such article, paragraph, or subparagraph shall remain in effect and the supplemental provisions shall be considered as added thereto. Where any article, paragraph, or subparagraph in the GENERAL CONDITIONS is amended, voided, or superseded by any of the following paragraphs, the provisions of such article, paragraph, or subparagraph not so amended, voided, or superseded shall remain in effect.

ARTICLE I – GENERAL PROVISIONS:

Add the following:

"1.1.1.1 The Contractor's Bid shall be part of the Contract Documents."

"1.1.1.2 Form of "Agreement" shall be AIA Document A101, 'Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment is a Stipulated Sum,' 2017 Edition, modified to delete Article 5.1.7."

"1.1.6.1 In the event of conflict between the specifications and drawings, the provisions of the specifications shall govern."

"1.1.2.1 By executing the Contract, the Contractor represents that he has reviewed all Contract Documents, including architectural, structural, mechanical and electrical divisions of the plans and specifications, the cost of all materials and equipment shown in the Contract Documents have been included in the Contract Sum, and that all costs for materials and labor associated with the installation of such equipment have been included in the Contract Sum."

Add the following:

"1.4.1 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities: (1) The agreement; (2) Addenda, with those of later date having precedence over those of earlier date; (3) Supplementary Conditions; (4) The

General Conditions of the Contract for Construction; (5) Specifications, and; (6) Drawings."

"1.4.2 Wherever the word "ARCHITECT" appears in the GENERAL CONDITIONS substitute therefore: "ARCHITECT/ENGINEER ("A/E")."

ARTICLE 2 - OWNER:

Modify the following:

2.1.1 Last line delete "authorized" and substitute therefore "designated."

Delete the following:

2.1.2 Delete subparagraph 2.1.2 in its entirety.

2.2.5 Delete subparagraph 2.2.5 in its entirety and substitute the following:

"2.2.5 The A/E will furnish to the Contractor free of charge, five (5) copies of the Drawings and Specifications and will furnish at actual cost of reproduction as many additional copies as he may require."

Add the following:

"2.4.2 The Owner reserves the right to perform any work on the site, whether within or without the scope of this Contract, necessary to correct any conditions which at the sole discretion of the Owner pose a hazard to the health or safety of pupils, teachers, staff, administrators, or the general public. Such work will only be done on an emergency basis. If practical under the circumstances, the Contractor shall be given notice of any such conditions and given a reasonable opportunity to correct them. If work is done by the Owner pursuant to this subparagraph which is necessitated by any act or failure to act of the Contractor, the costs associated with such work shall be deducted from any sums due to Contractor and a written Change Order adjusting the Contract Sum will be issued."

ARTICLE 3 - CONTRACTOR:

Add the following:

"3.2.2.1 The following principles shall govern the settlement of disputes which may arise over discrepancies in the drawings: (a) as between figures given on drawings and the scaled measurements, the figures shall govern - no measurements should be taken by scale as working dimensions except on large-scale drawings not dimensioned in detail; and (b) as between large-scale drawings and small-scale drawings, the larger scale shall govern."

"3.6.1 The Contractor's attention is directed to Title 12, Chapter 9, Code of Laws of South Carolina 1976, as amended, concerning withholding tax for non-residents, employees, contractors and subcontractors."

"3.7.1.1 The Owner shall secure and pay for water and sewer tap fees.

"3.7.1.2 In order that the inspection services of municipal or county building departments might be made available for plumbing, heating, air conditioning, and electrical work, the Contractor shall

require that each Subcontractor for these specialty Contracts apply for, obtain, and pay the cost of permit and inspection fees for that specialty for which he is a Subcontractor; provided that his project is to be constructed within a municipality or county offering such services."

Add the following:

"3.7.3.1 If the Contractor observes that portions of the Contract Documents are at variance with applicable laws, statutes, ordinances, building codes, and rules and regulations, the Contractor shall promptly notify the Architect and Owner in writing."

"3.8.4 The amount due the Contractor for any allowance shall be based upon certified copies of invoices from suppliers and Sub-contractors and shall not include any costs provided for in Paragraph 3.8.2.2."

"3.9.2.1 The Superintendent shall maintain a written daily log of the progress of the work. This log shall be kept at the job site, made available for inspection upon request by the A/E or Owner, and faxed daily or copies mailed to the Owner upon accumulating three (3) days of reports. The reports shall contain as a minimum: Date, Day, Low & High Temperatures, Record of Precipitation, Quantity of General Contractor and Subcontractor Personnel on Site, General Description of Work Activities Performed, List of Items Needed from General Contractor's Office and from the Architect (that are currently schedule sensitive), any other comments that pertain to job progress and quality, and a record of verbal instructions/interpretations given to the Contractor."

"3.10.1.1 This schedule shall indicate the dates for the starting and completion of various stages of construction and shall be revised monthly as required by the conditions of the work. This schedule shall be broken down into work items as the Owner may require for proper review."

"3.10.1.2 If the original Contract Sum exceeds One Million Dollars, the Contractor shall prepare a time-scaled Critical Path Method ("CPM") schedule and shall update this schedule monthly. Copies of the original schedule and all updates shall be provided to the Owner. A copy shall be maintained at the job site office. Additionally, a two-week look ahead or similar schedule shall be used and maintained at the job site office."

"3.10.1.3 The Contractor shall submit, along with the initial progress schedule, a shop drawing schedule showing items requiring review or approval by the A/E. The shop drawing schedule shall allow ten (10) working days for A/E's review and shall show the date receipt of approval is required."

"3.12.11 At completion of construction, the Contractor shall furnish Owner with two (2) copies of all final field use shop drawings, manufacturer's diagrams, literature, etc., for his permanent files."

"3.12.12 At the completion of construction, the Contractor shall furnish the Owner with two (2) sets of Maintenance Instructions for all items including name and address of supplier and name, address and telephone number of the individual to contact for service, all compiled in indexed hard cover binders."

"3.14.1.1 It is Contractor's duty to coordinate with his Subcontractors in advance so that pipe holes, sleeves, inserts, etc., can be installed as work progresses."

ARTICLE 4 - ARCHITECT:

Modify as follows:

4.1.2 Second line following "------Owner" delete "the Contractor."

Add the following:

"4.1.4 In the Specifications or on the Drawings, where the words "as directed," "as required," "as approved," "as permitted" or words of like effect are used, Contractor shall understand that direction, requirement, approval, or permission of the A/E is intended. Similar words "approved," "acceptable," "satisfactory," or words of like effect mean approved by, acceptable to or satisfactory to the A/E."

Modify as follows:

4.2.4 Add the following sentence: "The Owner's designated representative shall have the right to communicate directly with the Contractor."

4.2.10 Delete this subparagraph and insert the following in lieu thereof:

"If a Project Representative is provided; his duties, responsibilities and limitations of authority shall be as set forth in ARCHITECTURAL SERVICES: ON-SITE PROJECT REPRESENTATION, AIA DOCUMENT B207- 2017, latest edition, copy of which will be provided to Owner, Contractor and Project Representative."

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTOR:

6.2.5 Add the following:

"6.2.5.1 If such separate Contractor sues or initiates an arbitration proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall defend such proceedings at the Contractor's expense and, if any judgment or award against the Owner arises there from, the Contractor shall pay or satisfy it."

ARTICLE 7 - CHANGES IN THE WORK:

Add the following:

"7.1.2.1 Change Orders and Construction Change Directives are effective only after approval by the Owner. Board approval may be required on change orders and construction change directives greater than $5,000."

"7.3.8.1 In determining the total cost or credit to the Owner resulting from a change in the work, the allowances for overhead and profit combined, including the total cost to the Owner, shall not exceed the percentages herein scheduled, as follows:

1. For the Prime Contractor, for any work performed by his own forces, 10% of the direct cost;

2. For each Subcontractor involved, work performed by his own forces, 10% of the direct cost;

3. For the Prime Contractor, for work performed by his Subcontractor, 10% of the amount due the Subcontractor."

"7.3.10.1 The Contractor agrees that when it executes a Change Order, it is prohibited from seeking any further damages or time extensions for the matters contained in the Change Order and that it has been fully compensated for all aspects of this work including those items listed as direct costs and overhead in subparagraph 7.3.7."

ARTICLE 8 - TIME:

Modify as follows:

8.3 Delay and Extension of Time: Delete in its entirety and substitute therefore the following:

"8.3 Delay and Extension of Time:"

"8.3.1 Completion time stipulated under other sections of the Contract Documents may be extended by Change Order or Construction Change Directive to provide one (1) additional workday for each full workday that the Contractor is prevented from working by reason of one or more of the following causes:

1. Unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not limited to, catastrophes and/or acts of God, acts of another Contractor in the performance of a separate Contract with the Owner, epidemics, quarantine restrictions, strikes or freight embargoes;

2. An unusual amount of severe weather to such an extent as to be definitely abnormal and beyond conditions that may be reasonably anticipated. For the purpose of this Contract, a total of FIVE (5) working days per calendar month shall be anticipated as "normally bad or severe weather," and such time will not be considered justification for an extension of time. Weather related time extensions shall be determined on a monthly basis upon proper notification. The FIVE (5) days each month shall not be aggregated for the entire project for the purpose of determining weather related time extensions;

3. Stoppage of work ordered by Owner or A/E for reasons over which Contractor has no control."

"8.3.2 The Contractor shall, within ten (10) days after the beginning of such delay notify the Owner and A/E, in writing, of the cause of the delay. The A/E will then ascertain the facts and extent of delay and notify the Contractor within ten (10) days of the Owner's decision in the matter. Notice of delay and requests for extension of time shall set forth the cause, and number of additional working days Contractor desires Contract extended."

"8.3.3 No claims for extension of time will be considered when based on delays caused by conditions existing at the time bids were received, and of which the Contractor might be reasonably expected to have full knowledge at the time of bidding, or upon delays caused by failure on the part of the Contractor to anticipate properly the requirements of the work contracted for as to materials, labor and equipment. All claims for extension of time shall be made in writing to the A/E with the next application for payment; otherwise they shall be waived."

"8.3.4 Completion date stipulated under other sections of the Contract Documents may be extended by Change Order to compensate for additional work that may be ordered by Owner, provided such work is over and beyond scope of work covered by original Contract and is of such nature as to materially affect date of completion."

"8.3.5 The Contractor shall not be entitled to any damages because of hindrances or delays from any cause whatsoever, but if occasioned by any act of God, or by any act or omission on the part of the Owner, such act, hindrance, or delay may entitle the Contractor to an extension of time in which to complete the work which shall be determined by the A/E provided that the Contractor gives notice in writing of the cause of such act, hindrance or delay within ten (10) days after its occurrence."

ARTICLE 9 - PAYMENT AND COMPLETION

Modify as follows:

9.3.1 Fifth line following "notarized" delete "if required."

Add the following:

"9.3.1.3 The A/E will authorize, as provided in Paragraphs 9.4 and 9.5, monthly payments equal to ninety-six and one-half percent (96.5%) of the portion of the Contract Sum properly allocable to labor, material and equipment suitably stored until the work is fifty percent (50%) complete. When the work is fifty percent (50%) complete, the Owner may authorize remaining partial payments to be paid in full provided acceptable performance and scheduling has been maintained."

"9.3.1.4 Contractor's Application for Payment shall be on AIA Documents G702 & G703 or equivalent."

"9.3.2.1 Rental equipment such as, but not limited to, mobile equipment, pans, forms, scaffolding, compressors, etc., shall not be considered material stored."

Add the following:

"9.11 Nonresident Contractor's attention is directed to Title 12, Chapter 9, Code of Laws of South Carolina 1976, as amended, concerning withholding tax on nonresident employees, contractors and subcontractors."

"9.12 The Contractor's attention is directed to Title 29, Chapter 7, Code of Laws of South Carolina, 1976, as amended, concerning laborers' liens."

Add the following:

"9.13 Final Payment including retainages shall not be due until the following have been submitted and approved by the A/E. These requirements are conditions precedent to final payment:

a. the final punch list has been completed and a copy of the list submitted showing the disposition of each item,

b. a final inspection has been conducted,

c. Certificate of Substantial Completion has been properly approved and filed,

d. an affidavit has been provided that all payrolls, bills for materials and equipment, and other indebtedness conducted with the work for which the Owner or its property might in any way be responsible, have been paid or otherwise satisfied,

e. the consent of the Surety, if any, to final payment is provided,

f. two (2) complete sets of specifications, including all addendums, are provided,

g. two (2) copies of all final field use shop drawings on material, equipment, etc., are provided,

h. two (2) sets of maintenance instructions for all items, name and address of supplier, name address and telephone number of persons to contact for service, all compiled in indexed hard cover binders are provided. These materials will be submitted to the A/E who will forward them to the Owner,

i. A master list of all subcontractors with address and telephone numbers. Organize the list by CSI specification numerical order."

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY:

Add the following:

"10.2.8.1 The Owner reserves the right to perform any work on the site necessary to correct any conditions which pose a hazard to the health or safety of pupils, teachers, staff, administrators, or the general public."

Delete the following:

Delete subparagraph 10.3.3 in its entirety.

ARTICLE 11 - INSURANCE AND BONDS:

Add the following:

"11.1.2.1 Minimum limits of liability for the following types of insurance are required (B.I. = Bodily Injury; P.D. = Property Damage; limits are shown in thousands of dollars).

1. Workers' Compensation, including:

a.	Workers' Compensation Insurance	State Minimum Coverage
b.	Employers' Liability	State Minimum Coverage

2. Comprehensive General Liability, including:

a.	Premises and Operations	1,000,000 B.I.;	100 P.D.
b.	Elevator Liability	1,000,000 B.I.;	100 P.D.
c.	Contractor's Protective Liability	1,000,000 B.I.;	100 P.D.
d.	Products Liability, including completed operations coverage	1,000,000 B.I.;	100 P.D.

3. Comprehensive Automobile Liability, including:

a.	All owned Automobiles	250/500 B.I.;	100 P.D.
b.	Non-owned Automobiles	250/500 B.I.;	100 P.D.
c.	Hired Car Coverage	250/500 B.I.;	100 P.D."

"11.1.2.2 In addition to Contractual Liability including the indemnification provision, Bodily Injury, and Property Damage coverage under both Comprehensive General and Comprehensive Automobile forms, shall include "occurrence" basis wording, which means an event, or continuous or repeated exposure to condition which unexpectedly causes injury or damage during the policy period."

"11.1.2.3 Contractor shall either (a) require each of its Subcontractors to procure and maintain during the life of its Subcontract, Subcontractor Comprehensive General Liability, Automobile Liability, and Property Damage Liability Insurance of the type and in the same amounts as specified in this Subparagraph, or (b) insure the activities of its Subcontractors in its own policy."

"11.1.2.4 If excavation is required, Contractor shall obtain underground hazard coverage in addition to those shown above."

Add the following:

"11.4.1.1 Contractor shall provide and pay the cost of Performance and Payment Bonds, in the form of AIA Document A312-2010 "PERFORMANCE BOND AND PAYMENT BOND." Each shall be in the full amount of the Contract Sum, issued by a Surety company licensed in South Carolina, with an "A" minimum rating of performance as stated in the most current publication of Best's Key Rating Guide, Property Liability, which shall show a financial strength rating of at least five (5) times the Contract Price. Each Bond shall be accompanied by a "Power of Attorney" authorizing the attorney-in-fact to bind the Surety and certified to include the date of the Bond."

"11.4.1.2 The Owner reserves the right to accept or reject the qualifications of any bonding company submitted by the Contractor."

ARTICLE 13 - MISCELLANEOUS PROVISIONS:

Add the following:

"13.1.1 By executing a Contract for the project, the Contractor agrees to submit itself to the jurisdiction of the courts of the State of South Carolina for all matters arising or to arise hereunder, including but not limited to performance of the Contract and payment of all licenses and taxes of whatever nature applicable thereto."

Delete the following:

13.6 Interest: Delete Paragraph 13.6 in its entirety.

ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT:

Add the following:

"14.2.2.3.1 The Owner shall not be required to proceed in completing the work at the lowest possible cost."

"14.2.2.3.2 The costs of finishing the work may include, but not be limited to: (1) cost of labor and material, (2) additional Architectural services, (3) costs of advertising or bidding, (4) attorneys' fees, (5) administrative costs, and (6) all other costs or expenses directly or indirectly relating to the termination."

"14.2.5 Allowing the Contractor to re-enter the Project and continue the work shall not constitute a rescission of the seven (7) day notice previously given. If the Contractor fails or refuses to correct the conditions which gave rise to the termination notice, the Owner may terminate the Contract without any additional notice."

ARTICLE 15 – CLAIMS AND DISPUTES:

Add the following:

15.4 Add the following to the end of subparagraph 15.4.1:

"The Owner and Contractor shall agree on the number and selection of arbitrators. If they cannot agree, American Arbitration Association shall determine the appropriate number and shall select the arbitrators. If the arbitration is consolidated with another arbitration, American Arbitration Association shall determine the number and select the arbitrators."

15.4.5 If any disputes under this agreement are decided by arbitration, the prevailing party shall be entitled to recover all reasonable costs and expenses incurred, including reasonable attorney's fees. The prevailing party shall be determined by the procedures provided in South Carolina Code Annotated §29-5-20(b), as amended.

END OF SECTION 00800

AIA DOCUMENT G701-2017
CHANGE ORDER
IS A PART OF THESE BID DOCUMENTS AS IF PRINTED HEREIN IN ITS ENTIRETY.
DOCUMENT IS AVAILABLE FOR REVIEW AT THE OFFICE OF

Shepard & Associates, LLC
3547 Dreher Shoals Road, Suite 6
Irmo, SC 29063
803-407-8284

AIA DOCUMENT G702 and G703 - 1992
APPLICATION AND CERTIFICATE FOR PAYMENT
IS A PART OF THESE BID DOCUMENTS AS
IF PRINTED HEREIN IN ITS ENTIRETY.
DOCUMENT IS AVAILABLE FOR
REVIEW AT THE OFFICE OF

Shepard & Associates, LLC
3547 Dreher Shoals Road, Suite 6
Irmo, SC 29063
803-407-8284

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 WORK INCLUDED

1.1.1 Work covered by this contract includes furnishing all labor, materials, tools, devices, appliances, and equipment necessary to perform all the work described in the Contract Documents.

1.1.2 All work is located at St. James Middle School, 9775 St. James Road, Myrtle Beach, SC 29588. Refer to drawing R1.

1.2 BASE BID WORK

1.2.1 Roof Areas 16, 17, 18, 19, 20, 21, 22, 23, 24, C1, C2 & C3 (Approximately 40,728 SF): The work generally consists of the complete removal and disposal of the existing: aggregate surfaced Built-Up Roofing assembly down to the surface of the existing metal and cementitious wood fiber decking, metal through wall scupper liners, coping cap, gutters and downspouts on RA 24, and metal and bituminous flashings;

Preparations include, but are not limited to: the removal and replacement of damaged or deteriorated metal and cementitious wood fiber decking, wire brushing, and painting oxidized existing metal decking to receive new Roofing Assembly, install new wood blocking at perimeters, raising expansion joints, equipment curbs and sanitary vents, as necessary; disconnecting, raising and reconnecting existing gas piping and curb mounted rooftop equipment; wire brush, prime and paint existing gas piping on all roof areas and roof hatches

and the new installation of: wood blocking, ½" fire rated gypsum thermal barrier, and flat and tapered expanded polystyrene insulation, and a 1/4" cover board mechanically attached to the deck, two-ply modified asphalt roofing system with a cool roof cap sheet surfacing in cold adhesive, metal, bituminous, and liquid applied flashings, metal copings, gutter and downspouts, expansion joint flashings; overflow scupper liners, walk pads, gas pipe supports, condensate drain piping and supports, new metal splash blocks, new wall mounted ladders, and miscellaneous work, as specified herein.

1.3 ALTERNATE BID No. 1 WORK

1.3.1 Roof Areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 & 15 (Approximately 99,786 SF): The work generally consists of the complete removal and disposal of the existing Modified Bitumen Roofing assembly down to the surface of the existing metal and cementitious wood fiber decking, metal through wall scupper liners, coping cap, gutters and downspouts on RA 24, and metal and bituminous flashings;

Preparations include, but are not limited to: the removal and replacement of damaged or deteriorated metal and cementitious wood fiber decking; wire brushing, and painting oxidized existing metal decking to receive new Roofing Assembly, install new wood blocking at perimeters, raising expansion joints, equipment curbs and sanitary vents, as necessary; disconnecting, raising and reconnecting existing gas piping and curb mounted rooftop equipment; wire brush, prime and paint existing gas piping on all roof areas and roof hatches

and the new installation of: wood blocking, ½" fire rated gypsum thermal barrier, and flat and tapered expanded polystyrene insulation, and a 1/4" cover board mechanically attached to the deck, two-ply modified asphalt roofing system with a cool roof cap sheet surfacing in cold adhesive, metal, bituminous, and liquid applied flashings, metal copings, gutter and downspouts, expansion joint flashings; overflow scupper liners, walk pads, gas pipe supports, condensate drain piping and supports, new metal splash blocks, new wall mounted ladders, and miscellaneous work, as specified herein

1.4 ALTERNATE BID No. 2 WORK

1.4.1 Roof Areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 & 15 (Approximately 99,786 SF): The work generally consists of the complete removal and disposal of the existing bituminous and metal flashings, gutters and downspouts on RA 6, coping, expansion joint covers, and removal and disposal of abandoned equipment curbs;

Preparations include, but are not limited to: cutting out and replacing membrane at blisters in existing membrane, installation of new wood blocking at perimeters, raising expansion joints, equipment curbs and sanitary vents, as necessary; disconnecting, raising and reconnecting existing gas piping and curb mounted rooftop equipment; installation of drain bowl extensions at main roof drains; wire brush, prime and paint existing gas piping on all roof areas and roof hatches

and the new installation of: wood blocking, a 1/2" cover board mechanically attached, two-ply modified asphalt roofing system with a cool roof cap sheet surfacing in cold adhesive, metal, bituminous, and liquid applied flashings, metal copings, gutter and downspouts, expansion joint flashings; overflow scupper liners, walk pads, gas pipe supports, condensate drain piping and supports, new metal splash blocks, new wall mounted ladders, and miscellaneous work, as specified herein.

1.5 ALTERNATE BID N0. 3 WORK

1.5.1 Roof Areas 11, 14, 15, 16, 17, 18, 19, 23 (Locations of Equipment Screens and Wall Panels): The work generally consists of the removal of any loose or flaking paint, rust, or other surface contaminates;

Preparations include, but are not limited to: Preparing metal mechanical screens and wall panels to receive new paint that matches new sheet metal;

and the application of new primer and paint over the prepared wall panels and metal mechanical screens.

1.6 UNIT PRICES

1.6.1 Do include in the BASE BID WORK the following quantities of unit price materials:

1.6.1.1 Unit Price 1 – Removal and replacement of any damaged or deteriorated wood blocking. 1,500 BF

1.6.1.2 Unit Price 2 – Rust and scale removal and application of rust-preventive primer to corroded steel roof decking 250 SF

1.6.1.3 Unit Price 3 – Removal and replacement of any damaged or deteriorated metal decking. 30 SF

1.6.1.4 Unit Price 4 – Removal and replacement of any damaged or deteriorated cementitious wood fiber decking 120 SF

1.7 CONTRACT METHOD

1.7.1 Construct the work as a single lump sum contract. For the items that are bid on a unit price basis, follow procedure indicated on the Bid Form and as specified in Section 01025 MEASUREMENT AND PAYMENT.

1.8 REFERENCE STANDARDS

1.8.1 For products specified by the association or trade standards, comply with requirements of the standard except when more rigid requirements are specified or are required by applicable codes.

1.9 EXISTING SITE CONDITIONS

1.9.1 Information in this section is provided only to establish a general description and is not necessarily accurate. The Contractor is responsible for visiting the site and satisfying himself as to the existing conditions, size of existing roof areas, metal components, etc. before submitting his bid.

1.9.2 St. James Middle School:

Roof Area 1	- approximately	8,237 SF
Roof Area 2	- approximately	7,205 SF
Roof Area 3	- approximately	8,167 SF
Roof Area 4	- approximately	9,317 SF
Roof Area 5	- approximately	6,149 SF
Roof Area 6	- approximately	9,077 SF
Roof Area 7	- approximately	2,700 SF
Roof Area 8	- approximately	2,097 SF
Roof Area 9	- approximately	2,957 SF
Roof Area 10	- approximately	910 SF
Roof Area 11	- approximately	15,062 ST
Roof Area 12	- approximately	6,022 SF
Roof Area 13	- approximately	6,363 SF
Roof Area 14	- approximately	5,725 SF
Roof Area 15	- approximately	9,798 SF
Roof Area 16	- approximately	8,526 SF
Roof Area 17	- approximately	4,820 SF
Roof Area 18	- approximately	5,184 SF
Roof Area 19	- approximately	4,112 SF
Roof Area 20	- approximately	3,642 SF
Roof Area 21	- approximately	157 SF
Roof Area 22	- approximately	2,395 SF
Roof Area 23	- approximately	896 SF
Roof Area 24	- approximately	10,654 SF
Roof Area C1	- approximately	114 SF
Roof Area C2	- approximately	114 SF
Roof Area C3	- approximately	114 SF
Total Roof Area	- approximately	140,514 SF

1.9.3 Roof Areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, & 15

1.9.3.1 Existing roof system assembly consists of a 2 ply modified bitumen membrane roofing assembly.

1.9.3.2 Height above finished grade varies by RA and is approximately:

a. 16’ at RA 1
b. 16’ at RA 2
c. 16’ at RA 3
d. 16’ at RA 4
e. 16’ at RA 5
f. 16’ at RA 7
g. 23’ at RA 8
h. 23‘ at RA 9
i. 16‘ at RA 10
j. 16‘ at RA 11
k. 26‘ at RA 12
l. 16‘ at RA 13

m. 20‘ at RA 14
n. 16‘ at RA 15

1.9.3.3 Water drains to main roof drains. Through-wall overflow scuppers provide secondary drainage on these roof areas.

1.9.3.4 Slope in the existing insulation is approximately 1/8”

1.9.3.5 Roof areas are generally rectilinear in shape

1.9.3.6 Equipment Roof Area 1:

a. (10) Roof Drain(s)
b. (6) Through Wall Overflow Scupper(s)

1.9.3.7 Equipment Roof Area 2:

a. (8) Roof Drain(s)
b. (5) Through Wall Overflow Scupper(s)
c. (4) Sanitary Vent(s)
d. (1) Gravity Vent(s)

1.9.3.8 Equipment Roof Area 3:

a. (8) Roof Drain(s)
b. (6) Through Wall Overflow Scupper(s)
c. (6) Sanitary Vent(s)

1.9.3.9 Equipment Roof Area 4:

a. (9) Roof Drain(s):
b. (6) Through Wall Overflow Scupper(s)
c. (4) Sanitary Vent(s)

1.9.3.10 Equipment Roof Area 5:

a. (8) Roof Drain(s)
b. (3) Through Wall Overflow Scupper(s)
c. (1) Power Ventilator(s)
d. (8) Sanitary Vent(s)
e. (2) Gravity Vent(s)
f. (1) Metal Ladder

1.9.3.11 Equipment Roof Area 7:

a. (3) Roof Drain(s)
b. (3) Sanitary Vent(s)
c. (1) Roof Hatch
d. (1) Curb Mounted HVAC Unit(s)
e. (2) Metal Ladder(s)

1.9.3.12 Equipment Roof Area 8:

a. (3) Roof Drain(s)
b. (2) Through Wall Overflow Scupper(s)
c. (4) Sanitary Vent(s)
d. (4) Gravity Vent(s)
e. (2) Metal Ladders

1.9.3.13 Equipment Roof Area 9:

a. (3) Roof Drain(s) (1 with retrofit insert)
b. (4) Through Wall Overflow Scupper(s)

1.9.3.14 Equipment Roof Area 10:

a. (1) Roof Drain(s)
b. (1) Through Wall Overflow Scupper(s)

1.9.3.15 Equipment Roof Area 11:

a. (18) Roof Drain(s)
b. (5) Through Wall Overflow Scupper(s)
c. (3) Gravity Vent(s)
d. (1) Power Ventilator(s)
e. (1) Curb Mounted HVAC unit(s)
f. (2) Metal ladder(s)

1.9.3.16 Equipment Roof Area 12:

a. (6) Roof Drain(s)
b. (4) Through Wall Overflow Scupper(s)
c. (5) Gravity Vent(s)
d. (1) Antenna in a 6”x8” pitch pocket
e. (1) Metal Ladder

1.9.3.17 Equipment Roof Area 13:

a. (8) Roof Drain(s)
b. (7) Through Wall Overflow Scupper(s)
c. (9) Gravity Vent(s)
d. (3) Sanitary Vent(s)
e. (1) Curb Mounted HVAC unit(s)
f. (2) Hot Vent Stack(s)
g. (1) Roof Hatch

1.9.3.18 Equipment Roof Area 14:

a. (6) Roof Drain(s)
b. (5) Through Wall Overflow Scupper(s)
c. (3) Sanitary Vent(s)

d. (3) Gravity Vent(s)
e. (1) Curb Mounted HVAC Unit(s)
f. (1) Satellite Dish on a ballasted stand
g. (1) Metal Ladder(s)

1.9.3.19 Equipment Roof Area 15:

a. (8) Roof Drain(s)
b. (5) Through Wall Overflow Scupper(s)
c. (6) Sanitary Vent(s)
d. (6) Gravity Vent(s)
e. (1) Roof Hatch(s)
f. (1) Antenna mounted in a 6”x6” pitch pocket

1.9.4 Roof Area 6

1.9.4.1 Existing roof system assembly consists of a 2-ply modified bitumen membrane roofing assembly adhered to a mineral perlite cover board adhered in hot asphalt to flat polyisocyanurate insulation over a cementitious wood fiber (tectum) deck.

1.9.4.2 Height above finished grade is approximately 33’ above grade.

1.9.4.3 Water drains to eave end gutters and downspouts. Secondary drainage is over eave to grade below on this roof area.

1.9.4.4 Slope in the deck is approximately ¼” per foot.

1.9.4.5 Roof areas are generally rectangular in shape

1.9.4.6 Equipment Roof Area 6:

a. (4) Gravity Vent(s)
b. (7) Curb Mounted HVAC Unit(s)
c. (7) Pipe Penetrations
d. (1) Metal Ladder
e. (1) Gutter with (5) Downspouts

1.9.5 Roof Areas 16, 17, 18, 19, 20, 21, 22, 23, C1, C2, & C3:

1.9.5.1 Existing roof system assembly consists of an aggregate surfaced Built-Up Roofing (BUR) assembly, adhered in hot asphalt to a ¾” perlite cover board, adhered in hot asphalt to tapered perlite insulation and adhered to polyisocyanurate insulation and a gypsum thermal barrier mechanically attached to a metal roof deck.

1.9.5.2 Roof height above finished grade varies by RA and is approximately:

a. 16’ at RA 16
b. 17’ at RA 17

c. 16’ at RA 18
d. 16’ at RA 19
e. 23’ at RA 20
f. 16’ at RA 21
g. 23’ at RA 22
h. 16’ at RA 23
i. 10‘ at C1
j. 10‘ at C2
k. 10‘ at C3

1.9.5.3 Water drains to main roof drains on RAs 16, 17, 18, 19. 20, 21, 23, C1, C2, and C3. Through-wall overflow scuppers provide secondary drainage on these roof areas.

1.9.5.4 Slope in the existing insulation is approximately ¼” per foot.

1.9.5.5 Roof areas are generally rectangular in shape.

1.9.5.6 Equipment Roof Area 16:

a. (11) Roof Drain(s)
b. (10) Through Wall Overflow Scupper(s)
c. (8) Gravity Vent(s)
d. (8) Sanitary Vent(s)
e. (8) Curb Mounted HVAC Unit(s)
f. (1) Mechanical screen with (42) 4” leg penetrations

1.9.5.7 Equipment Roof Area 17:

a. (7) Roof Drain(s)
b. (7) Through Wall Overflow Scupper(s)
c. (7) Gravity Vent(s)
d. (1) Sanitary Vent(s)
e. (6) HVAC units on Equipment Curb(s)
f. (6) Pipe Penetration(s)
g. (1) Mechanical screen with (42) 4” leg penetrations

1.9.5.8 Equipment Roof Area 18:

a. (7) Roof Drains(s)
b. (6) Through Wall Overflow Scupper(s)
c. (2) Sanitary Vent(s)
d. (6) Gravity Vent(s)
e. (5) Curb Mounted HVAC Unit(s)
f. (1) Mechanical Screen with (38) 4” leg penetrations

1.9.5.9 Equipment Roof Area 19:

a. (7) Roof Drain(s)
b. (5) Through Wall Overflow Scupper(s)
c. (4) Gravity Vent(s)
d. (2) Sanitary Vent(s)
e. (5) Curb Mounted HVAC Unit(s)
f. (2) Pipe penetrations(s)
g. (1) Mechanical Screen with (36) 4” leg penetrations

1.9.5.10 Equipment Roof Area 20:

a. (4) Roof Drains(s)
b. (4) Through Wall Overflow Scupper(s)
c. (3) Gravity Vent(s)
d. (3) Curb Mounted HVAC Unit(s)
e. (3) Pipe Penetrations(s)

1.9.5.11 Equipment Roof Area 21:

a. (1) Roof Drain(s)
b. (1) Through Wall Overflow Scupper(s)
c. (1) Gravity Vent(s)
d. (2) Metal ladder(s)

1.9.5.12 Equipment Roof Area 22:

a. (4) Roof Drains(s)
b. (2) Through Wall Overflow Scupper(s)
c. (1) Gravity Vent(s)
d. Curb mounted HVAC Unit(s)
e. (2) Metal Ladders
f. (4) Metal Splash Blocks

1.9.5.13 Equipment Roof Area 23:

a. (2) Roof Drain(s)
b. (1) Through Wall Overflow Scupper(s)
c. (1) Sanitary Vent(s)
d. (2) Gravity Vent(s)

1.9.5.14 Equipment Roof Area C1:

a. (1) Roof Drain(s)
b. (1) Through Wall Overflow Scupper(s)

1.9.5.15 Equipment Roof Area C2:

a. (1) Roof Drain(s)

b. (1) Through Wall Overflow Scupper(s)
c. (1) Downspout with metal splash block

1.9.5.16 Equipment Roof Area C3:

a. (1) Roof Drain(s)
b. (1) Through Wall Overflow Scupper(s)
c. (1) Downspout with metal splash block

1.9.6 Roof Area 24

1.9.6.1 Existing roof system assembly consists of an aggregate surfaced Built-Up Roofing (BUR) assembly, adhered in hot asphalt to a ¾" perlite cover board, adhered in hot asphalt and adhered to polyisocyanurate insulation and a gypsum thermal barrier mechanically attached to a cementitious wood fiber roof deck.

1.9.6.2 The roof area height above grade is approximately 33' above grade.

1.9.6.3 Water drains to eave end gutters and downspouts at RA 24. Secondary drainage is over eave to grade below on this roof area.

1.9.6.4 Slope in the existing roof deck is approximately ¼" per foot.

1.9.6.5 The shape of the roof is generally rectilinear.

1.9.6.6 Equipment Roof Area 24:

a. (1) Gutter with (5) Downspout(s)
b. (4) Curb mounted HVAC Unit(s)
c. (1) Metal Ladder(s)

1.10 WORK SEQUENCE

1.10.1 Work shall proceed in an orderly sequence. Phased construction is unacceptable.

1.10.2 The Contractor shall strive to cause a minimum of disruption to the building operations and occupancy during construction activities.

1.11 COMPLETION DATE

1.11.1 Scheduling and speed of construction are of prime importance in the completion of the Work. Demolition, Preparation and New Construction shall commence as established in the Notice to Proceed. BIDDER agrees that the BASE BID WORK & AWARDED ALTERNATES will be substantially complete and ready for final payment in accordance with the General Conditions within 250 calendar days after Notice to Proceed. BIDDER acknowledges that in case of inclement weather during normal workdays, weekend work may be required to complete the Work within the allotted time.

1.12 LIQUIDATED DAMAGES

1.12.1 Lliquidated damages will be assessed in the amount of $500.00 for each calendar day the actual Contract Time for Substantial Completion exceeds the specified Contract Time.

1.12.2 Liquidated damages will be assessed in the amount of $500.00 for each calendar day the actual Contract Time for Final Completion exceeds 30 days following Date of Substantial Completion.

1.13 CONTRACTOR USE OF PREMISES

1.13.1 Limit use of premises for construction operations to allow for Owner occupancy.

1.13.2 Coordinate use of premises under direction of Owner.

1.13.3 The Contractor shall be held liable for any damages to the building, the building contents, or its occupants resulting from work under this contract. The Contractor shall take all precautions necessary to protect the occupants and the building during the construction period.

1.13.4 The Contractor is to maintain the existing building in a safe, weather tight, and secure condition throughout the construction period. The Contractor is to repair any damage caused by him or any of his subcontractors. Should damage be to finishes or construction that is not defined in these Contract Documents, then repairs shall be made to the specifications approved by and at the sole discretion of the Owner.

1.13.5 The Contractor is to confine his operations to the site of the building. The site beyond this building is not to be disturbed. The Owner will identify parking for the Contractor and his employees.

1.13.6 The Contractor is to keep existing driveways and entrances serving the premises clear and available at all times. Do not use for parking or storage of materials or equipment. The stockpiling of materials must be confined to the area identified by the Owner.

1.13.7 The Contractor and his personnel are to lock their vehicles and other mechanical or motorized construction equipment when parked and unattended. Do not leave vehicles or equipment unattended with motor running or ignition key in place.

1.13.8 Open fires will not be permitted on the premises.

1.13.9 Utilities and Services: The Contractor will be provided water to the extent of the existing sources. The Contractor shall be responsible for any taps or connections that may be needed or desired by him. He is also responsible for getting the service to any location where needed or desired. The Contractor will be provided without charge reasonable quantities of available utilities; however, if the services are abused, they will be withdrawn. The Contractor shall provide temporary portable electric generators for electricity required during construction.

1.14 Asbestos Products:

1.14.1 No products containing asbestos fibers are present in the work covered in the Base Bid at St. James Middle School.

1.14.2 No asbestos bearing materials are to be incorporated into the work as a part of this contract. No existing asbestos containing material is to be left or incorporated into the work of this contract.

1.14.3 In the event the Contractor finds asbestos containing materials not previously identified, then Contractor shall stop all work in the affected area and notify the Owner and Roof Consultant. Contractor shall provide all materials necessary to temporarily dry-in the affected area in the Base Bid. Additional work caused by the discovery, if authorized by the Owner, will be handled as a Change Order to this contract.

1.15 BACKGROUND CHECKS:

1.15.1 Conduct criminal background investigations of individuals working on Owner's property (sites occupied with students and sites not occupied with students).

1.15.1.1 SLED Background checks must be less than 12 months old on all individuals working on Owner's property.

1.15.2 As a minimum, obtain a complete South Carolina statewide criminal background investigation, covering a period for the last 7 years, for individuals and employees performing Work or services for entities such as subcontractors, sub-sub-contractors, and consultants who will perform Work or a service on this Project. In the event that the individual being investigated is from out of state, broaden the investigation to include their home state, as well as the state of South Carolina as outlined above. Obtain information from a company recognized by local law enforcement agency as qualified to do so. Costs associated with these criminal background checks are the responsibility of the Contractor.

1.15.3 The Contractor shall be responsible and liable for the conduct and actions of its employees and individuals working under it.

1.15.4 An individual with the following criminal convictions or pending charges will not be permitted on Owner's Project or property:

1.15.4.1 Rape
1.15.4.2 Child Molestation or Abuse
1.15.4.3 Sexually Oriented Crime
1.15.4.4 Drugs: Felony use, possession or distribution.

1.15.5 An individual with a prior conviction or pending charges contained in the aforementioned list shall not be permitted on the Project Site or the Owner's property.

1.15.6 The Owner may, at any time, request verification of criminal background investigation for an employee or subcontractor on Owner's property.

1.16 IDENTIFICATION:

1.16.1 Contractor Employee Identification:

1.16.1.1 All individuals working for the Contractor must be easily identifiable while on the Owners property.

1.16.1.2 All individuals must either wear work uniforms clearly identifying the name of the company they are working for or wear a picture identification badge.

1.16.1.3 Provide a picture identification badge for each employee who successfully passes a background check and substance abuse test and who will be working on this Project. These identification badges shall be worn in plain view while on the Project site or Owner's property. Employees without a proper identification badge will be escorted off the Project site or Owner's property. Costs of providing identification badges shall be the responsibility of the Contractor. As a minimum, the identification badges shall be computer produced and consist of the following information in a large, easily visible and legible font:

a. Full Name
b. Nickname
c. Current color photo
d. Name of Employer
e. Date of issue

1.17 UNDOCUMENTED EMPLOYEES/WORKERS

1.17.1 By entering into a Contract Agreement with the Owner to perform the work indicated in or required by the Contract Documents for this Project, the Contractor certifies that full and complete compliance with the applicable requirements of Title 8, Chapter 14 of the South Carolina Code of Laws, including the following additional provisions stated herein under this Article of the specifications, will be maintained throughout the Contract period.

1.17.2 The Contractor further agrees to provide, to the Owner, upon request, any documentation, required or requested, including, but not limited to, E-verification, to establish that you and your subcontractors and sub-subcontractors are in compliance with Title 8, Chapter 14. Pursuant to Section 8-14-60, "A person who knowingly makes or files any false, fictitious, or fraudulent documents, statements, or reports pursuant to this chapter is guilty of a felony, and, upon conviction, shall be fined within the discretion of the court or imprisoned for not more than five years, or both."

1.17.3 The Contractor also agrees to include, in any contracts with your subcontractors, language requiring your subcontractors to comply with the applicable requirements of this Article of the specifications and for these sub-contractors to include the provisions of this Article of the specifications in their contracts with their sub-subcontractors.

1.17.4 This Article of the specifications applies to the Contractor, the Contractor's sub-contractors and their sub-contractors including all sub levels of sub-contractors regardless of the number of employees and shall be applicable to each person who is employed directly or indirectly by or controlled by the Contractor and who performs any type of work on this project and receives any type of compensation, either directly or indirectly from the Contractor, for the work performed on this Project. Throughout the duration of this Contract, the Owner reserves the right to require the Contractor to provide proof of compliance with these provisions of the specifications for any single or all applicable previously defined employees.

1.17.5 If the Contractor believes that he or his sub-contractors should be exempted from the provisions of this Article of the specifications, then that Contractor shall submit a full written explanation, including supporting documentation and proof, to the Owner. This documentation must be submitted within five (5) days after receipt of bids. Requests for exemption will not be accepted or considered after Contract Execution.

1.18 Contractor's Conduct: The following requirements are expressed to the Contractor, and he is asked to ensure that all employees, subcontractors, and suppliers are aware of these warnings.

1.18.1 No drugs, alcohol, or firearms will be permitted on the grounds of the facility.

1.18.2 There will be no favors or fraternizing with students, faculty and staff, or employees of the facility.

1.18.3 Contractors, subcontractors and their employees are required to wear appropriate work wear, hard hats and safety footwear, as the case may be, while on campus. Articles of clothing must be neat and tidy in appearance, and cannot display offensive or inappropriate language, symbols or graphics. The Owner has the right to decide if such clothing is inappropriate.

1.18.4 Contractor and sub-contractors are to take necessary precautions to protect all occupants and employees of the facility, Contractor personnel, and personal property from any damage from their operations.

1.18.5 The Contractor, subcontractors, and material suppliers are to be careful during placement of materials and equipment. The Owner will in no way be responsible for equipment and materials lost as the result of being left unattended or misplaced.

1.18.6 The use of foul, obscene, or abusive language by the Contractor's or subcontractor's employees is prohibited on the grounds of the facility. Violations of this policy may result in the dismissal of the Contractor.

1.18.7 Smoking or use of any tobacco products by the Contractor's or subcontractor's employees is prohibited on the grounds of the facility. Violations of this policy may result in the dismissal of the Contractor.

1.19 OWNER OCCUPANCY REQUIREMENTS

1.19.1 Owner will occupy premises during entire period of construction for conducting normal operations. Contractor is to cooperate with the Owner's operations.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01010

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SUMMARY

1.1.1 A payment or payments made to 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.

1.1.2 All sums received by the Contractor for any part or parts of the work furnished or performed by a Subcontractor 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.

1.1.3 Contractor shall submit with payment request lien releases from material suppliers which state that suppliers have been paid for materials supplied to the project. Payment requests may be delayed if not received in a timely manner.

1.1.4 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 charges to the Site.

1.1.5 Contractor shall submit with payment application all claims for weather related delays on a monthly basis.

1.2 APPLICATION FOR PAYMENT

1.2.1 Monthly Application for Payment shall be submitted in triplicate to Roof Consultant for review and forwarding to Owner on AIA Documents G702 and G703. Provided an Application for Payment is received by the Roof Consultant not later than the 25th day of a month, the Owner shall make payment to the Contractor not later than the last day of the following month. If an Application for Payment is received by the Roof Consultant after the application date fixed above, payment shall be made by the Owner no later than 30 days after the Roof Consultant receives the Application for Payment. Contractor shall be furnished copy of Owner's Payment Schedule indicating payment dates and outline for receipt of payment requests.

1.2.2 Ninety-six and one-half percent (96.5%) of the value of materials stored at the site and 96.5% of work accomplished, less previous payments, shall be paid by Owner to Contractor in monthly installments upon Architect's certification.

1.2.3 Final payment shall be made 30 days after Roof Consultant has certified completion to the Owner, and specified warranties are provided in accordance with

Section 01740.

1.3 UNIT PRICES

1.3.1 A Unit Price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3.2 Before proceeding with work, Contractor shall survey the work to be covered under Unit Prices in the presence of the Roof Consultant for verification of quantities for the Project.

1.3.3 Unit Price Schedule: Unit Prices shall include costs of materials, delivery, labor (to remove and replace), insurance, rental of tools and equipment, overhead and margin of profit.

1.3.3.1 Include 1,500 board feet in the Base Bid costs for replacement of any damaged or deteriorated wood blocking members. Quote a separate unit price (per board foot) for such work. The final contract amount will be adjusted by change order increasing or decreasing the final contract price based on the actual replacement made during the course of the work using the quoted unit price.

1.3.3.2 Include 250 square feet in the Base Bid costs for rust and scale removal and application of rust-preventive primer to corroded steel roof decking. Quote a separate unit price (per square foot) for such work. The final contract amount will be adjusted by change order increasing or decreasing the final contract price based on the actual replacement made during the course of the work using the quoted unit price.

1.3.3.3 Include 30 square feet in the Base Bid costs for removal, disposal and replacement of any damaged or deteriorated metal decking. Quote a separate unit price (per square foot) for such work. The final contract amount will be adjusted by change order increasing or decreasing the final contract price based on the actual replacement made during the course of the work using the quoted unit price.

1.3.3.4 Include 120 square feet in the Base Bid costs for removal, disposal and replacement of any damaged or deteriorated cementitious wood fiber (tectum) decking. Quote a separate unit price (per square foot) for such work. The final contract amount will be adjusted by change order increasing or decreasing the final contract price based on the actual replacement made during the course of the work using the quoted unit price.

1.3.4 Contractor shall maintain a daily log showing dates, location, and exact quantities of unit price work. Copies of log and appropriate change order forms shall be submitted with each request for payment from the contractor unless no unit price

work is accomplished during the payment period. If appropriate, Payment Applications containing unit price work will not be processed unless unit price logs are attached.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01025

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 PROCEDURES

1.1.1 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. Deviations from Contract Documents shall be identified.

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

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

1.2 BID SUBMITTALS

1.2.1 Refer to Invitation to Bid, Instructions to Bidders, & Supplementary Instructions to Bidders.

1.2.2 Drug-Free Workplace Statement (a part of bid form agreements).

1.2.3 Illegal Immigration Reform Act of 2008 (a part of bid form agreements).

1.2.4 SLED Background Check and National Sexual Predator Database Requirements (a part of bid form agreements).

1.3 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

1.3.1 Contractor submittals shall be forwarded to Roof Consultant within 14 calendar days after receipt of signed Contract. The successful Contractor shall submit 5 copies of the required information to the Roof Consultant. Two copies will be returned to the Contractor for their use.

1.3.2 Refer to Section 01340 “Shop Drawings, Product Data and Samples.”

1.4 CONTRACTOR INFORMATION

1.4.1 Submit to Roof Consultant on or before Pre-Construction Conference the following documents:

1.4.1.1 A letter from the Contractor identifying the brand name, manufacturer and material proposed for use and include a statement that all proposed materials meet the specification requirements. Obtain Owner’s approval before placing orders.

1.4.1.2 Emergency contact information including phone numbers of principals, superintendent, foreman, and project manager.

1.4.1.3 A Manufacturer’s Certificate clearly stating that the specified roof covering meets the requirements for an Underwriter’s Laboratories, Inc. Class A roof covering.

1.4.1.4 Foreman's Statement (copy attached).

1.4.1.5 Material Safety Data Sheets (3 copies).

1.4.2 If Project Specifications indicate that removal and disposal of Asbestos Containing Material (ACM) is required, copies of the Application for an Asbestos Disposal Permit and the SCDHEC Asbestos Disposal Permit for this Project shall be furnished to the Roof Consultant prior to start of roof removal work.

1.4.3 Submit to Roof Consultant within 2 weeks of project startup and must be approved prior to Contractor’s First Application for Payment:

1.4.3.1 A copy of AIA Document G703 listing each phase of the work and its scheduled value for approval.

1.4.3.2 Submit for each bulk shipment of asphalt a Manufacturer’s Certificate clearly stating type of asphalt and compliance with referenced standard.

1.4.3.3 Furnish Manufacturer’s Certificates of Compliance with materials’ specifications for materials to be incorporated into the work. Certificates are to be signed by a responsible officer of the manufacturing firm and notarized.

1.4.4 Submit with each Monthly Payment Application a fully executed Contractor’s Affidavit of Payment of Debts and Claims, AIA G706, and Contractor’s Affidavit of Waiver of Release of Liens, AIA G706A.

1.4.5 Submit to Roof Consultant upon completion of the work and prior to Contractor’s Final Application for Payment:

1.4.5.1 Certificate of Substantial Completion, AIA G704.

1.4.5.2 Roof Consultant’s Final Punch list executed by Contractor that all work has been complete.

1.4.5.3 List of Subcontractors by specialty, including address and telephone number.

1.4.5.4 Consent of Surety to Final Payment, AIA G707.

1.4.5.5 Contractor's Affidavit of Payment of Debts and Claims, AIA G706.

1.4.5.6 Contractor's Affidavit of Release of Liens, AIA G706A.

1.4.5.7 "No Asbestos" Certification (Statement on Contractor's letterhead that no asbestos containing materials were used in the completion of the Work.)

1.4.5.8 Contractor's 2-year Watertight warranty to Owner.

1.4.5.9 Roof Manufacturer’s 20-year NDL Labor & Material Warranty to Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 TIMING

3.1.1 Make all submittals in accordance with schedules specified herein.

3.1.2 A minimum of 10 calendar days shall be allowed for review by the Roof Consultant following his receipt of the submittal.

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

3.1.4 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 Roof Consultant 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 the Contractor to proceed with fabrication, purchase, or both subject to the revisions, if any, required by the Roof Consultant’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 Roof Consultant under the provisions of the General Conditions.

3.2.4 Only those revisions directed or approved by the Roof Consultant shall be shown on the resubmittal.

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

END OF SECTION 01300

ENCLOSURE: Foreman’s Statement Form

FOREMAN'S STATEMENT

A PROJECT MANUAL FOR ROOFING AND

HVAC REPLACEMENT PROJECT

AT ST. JAMES MIDDLE SCHOOL

DECEMBER 2021

I, _____ (Print Name), an employee of

_____ (Print Contractor Name) hereby

state that I have my own personal copy of the above referenced project specifications and drawings, have thoroughly read them, and have visited the work sites.

By _____

Date _____

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 GENERAL

1.1 SHOP DRAWINGS

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

1.1.2 Shop drawings are to be submitted by transmittal letter with the following information:

1.1.2.1 Roof Consultant's Project Number

1.1.2.2 Submittal Data

1.1.2.3 Submittal Number

1.1.2.4 Project Title

1.1.2.5 Name of Contractor and Approval Date

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 Consultant.

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.

1.1.6 With respect to standard manufactured items, Contractor shall submit to Roof Consultant 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 Roof Consultant may maintain a minimum of 2 copies and return to Contractor the number required for Contractor's use.

1.1.7 Contractor shall submit 5 copies of each drawing. Two final approved copies will be returned to the Contractor.

1.1.8 Submit shop drawings for the following details:

1.1.8.1 Wood blocking attachment at equipment curbs, expansion joints and perimeter parapet walls.

1.1.8.2 Base Sheet fastening pattern.

1.1.8.3 Insulation layout.

1.1.8.4 Coping cap, primary and overflow scupper liners, conductor head and downspout, gutter and downspout, expansion joint flashing, sanitary vent flashing, pipe penetration flashing, counter flashing, condensate pipe supports, and conduit pipe supports. Provide complete with flashings and attachment method.

1.1.8.4.1 Minimum required components include wood blocking, fasteners, insulation, cover board, cants, tapered edge strips, adhesives, cements, membrane plies, cap sheet, metal, bituminous and acrylic resin flashings, and sealant.

1.2 PRODUCT DATA

1.2.1 On Contractor’s letterhead, in a list form, submit a complete description of the materials to be used on the project including roofing system and all its components, the respective manufacturer, and a statement that all the listed items meet the requirements of the project specifications.

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

1.3 SAMPLES

1.3.1 Submit two 6-inch-long samples of each metal shape to be used on this Project to Roof Consultant 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.

1.4 RELATED SECTIONS

1.4.1 Section 01300 “Submittals.”

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01340

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.1 QUALITY CONTROL – CONTRACTOR

1.1.1 Maintain quality control over products, services, site conditions, and workmanship to produce work of specified quality.

1.2 QUALITY CONTROL – OWNER

1.2.1 The Owner reserves the right, at his discretion, to retain the services of an independent construction monitoring representative to provide full or periodic inspection of the project. If Owner engages this service, the Contractor will be informed. Testing may be performed to determine any deficiencies in the assembly.

1.2.2 Work found in violation of the Specifications or not in conformance with acceptable workmanship practices/standards shall be subject to rejection, including complete removal and replacement with new materials at Contractor's expense.

1.2.3 Failure of Owner or Roof Consultant to discover or reject defective work, or work not in accordance with the Contract, shall not be deemed an acceptance thereof, or a waiver of Owner's rights to Contractor's compliance with the Contract or performance of the work, or any part thereof. No partial or final payment, or partial or entire occupancy, by Owner shall be deemed to be an acceptance of work or of material which is not strictly in accordance with the Contract, nor shall it be deemed a waiver by Owner or any of Owner's rights pursuant to this Contract or otherwise.

1.2.4 Contractor may be made to uncover work in-place to determine the quantity and quality of material and workmanship. Contractor photographs may or may not be accepted to validate fasteners, fastener frequency, unit price work, and other elements of the work concealed by project finishes.

1.3 QUALITY ASSURANCE

1.3.1 Roofing Contractor Qualifications: A Roofing Contractor experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance. Installer shall employ workers trained and approved by manufacturer. The Roofing Contractor shall be licensed as a specialty roofing contractor with at least 5 years of contracting experience in the type of work involved in this project and must have performed work similar to the proposed scope of work. Evidence of qualifications must be available by the Contractor upon request of the Owner.

1.3.2 Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

1.4 QUALITY CONTROL

1.4.1 Owner Responsibilities: Owner will provide inspections during the work. Such inspections may be daily or periodic.

1.4.2 Contractor Responsibilities: Unless otherwise indicated, provide quality-control inspections with Contractor’s own work force. Repair or replace nonconforming work.

1.4.3 Associated Services: Cooperate with agencies performing inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Provide the following:

1.4.3.1 Access to the Work.

1.4.3.2 Incidental labor and materials necessary to facilitate inspections.

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

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 REPAIR AND PROTECTION

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

3.1.1.1 Provide materials and comply with installation requirements specified in other Sections of these Specifications.

3.1.1.2 Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.

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

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

END OF SECTION 01400

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 DESCRIPTION

1.1.1 Contractor shall provide for temporary facilities and controls required for the performance of the project except as otherwise noted. Such items include, but are not necessarily limited to, water, electricity, and telephone; sanitary facilities; protection, security and safety materials; and enclosures such as tarpaulins, barricades, fences and canopies.

1.1.2 All equipment furnished by Contractor shall comply with all pertinent safety requirements.

1.1.3 Ladders, planks, hoists, chutes, and all similar items furnished in the execution of the work are to comply with all requirements of OSHA and any other regulatory agency having jurisdiction over this project.

1.1.4 All temporary facilities will be subject to the Owner's approval.

1.2 PRODUCT HANDLING

1.2.1 Contractor shall exercise all means necessary to maintain temporary facilities and controls in proper and safe condition throughout the progress of the project.

1.2.2 All required connections to existing utility systems shall be made with minimum disruption. If disruption of existing service is required, notice shall be given to the Owner and connections shall not be made without Owner's approval. If necessary, Contractor shall provide for alternate temporary service.

PART 2 PRODUCTS

2.1 TEMPORARY UTILITIES

2.1.1 Electricity: Owner will not furnish electricity to the Contractor during this project. Contractor to provide temporary power as necessary to complete the work of this project.

2.1.2 Water: The Contractor will be provided water to the extent of the existing sources. The Contractor shall be responsible for any additional water that may be needed or desired by them. The Contractor is also responsible for getting the water to any location where needed or desired.

2.1.3 Telephone: The project foreman and superintendent must have a cell phone, and it must be active the entire construction period.

2.1.4 Connects and Disconnects: In the event it is necessary to disconnect any electrical wiring or connections, plumbing lines, gas lines, or other building services, notify the Owner 72 hours in advance to provide sufficient advance time to minimize

disruption of service. Contractor shall not disconnect or connect services unless authorized in writing by Owner.

2.2 TEMPORARY FACILITIES

2.2.1 Sanitary Facilities: The Contractor shall provide and maintain proper temporary self-contained sanitary facilities in the quantity required for use of all personnel. All facilities shall be maintained in a sanitary condition at all times.

2.2.2 Ventilated Storage Facilities: Provide, as required, facilities to maintain specific storage conditions as described within this Specification and as recommended by the materials' manufacturers for use in construction.

2.3 CONSTRUCTION AIDS

2.3.1 Roof Access: The Contractor shall provide equipment for access to the roof unless otherwise directed by Owner.

2.3.2 Ladders: The Contractor shall remove all ladders from the roof and site at the end of work each day. Ladders may be stored in locked storage trailer.

2.3.3 Fire Extinguishers: Contractor shall provide adequately sized fire extinguishers for the project site.

2.3.4 Contractor is to ensure all moving equipment has a "Kill Switch" or emergency stop button. Switch is designed to disengage movement of equipment instantly.

2.3.5 Enclosures: The Contractor shall provide fencing, barricades, warning signs, and all necessary safeguards to warn and prevent workers, pedestrians, and Owner's personnel from being exposed to dangers or hazards created by this project.

2.3.6 Temporary Construction: The Contractor shall furnish, install, and maintain for the duration of the project all scaffolds, ladders, tarpaulins, platforms, bridges, canopies, steps, and other temporary construction required to properly facilitate completion of the project in compliance with all safety and other regulations.

2.3.7 Signs: No signs or advertising of any kind shall be allowed on the project site unless approved in advance by Owner.

2.3.8 Parking: Contractor's construction vehicles shall enter the project site and park in areas as directed by the Owner. The Contractor shall be responsible for coordination of traffic by his subcontractors, suppliers, etc., so as not to disrupt ongoing operations of the Owner.

PART 3 EXECUTION

Not Used.

END OF SECTION 01500

SECTION 01560

CONSTRUCTION CLEANING

PART 1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Scrap, debris, waste material, and other items from all operations shall not be allowed to accumulate on the Project site. Debris shall be removed and properly disposed of daily in accordance with all Federal, State, and Local regulations in a manner which prevents injury or damage to persons, adjoining properties and public rights-of-way.

1.1.2 The buildings and site shall be maintained in a clean condition throughout the duration of the Project. Contractor shall comply with all requirements for cleanliness described in other sections of these Specifications.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

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

2.1.2 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 Roof Consultant.

PART 3 EXECUTION

3.1 PROGRESS CLEANING

3.1.1 Contractor shall conduct daily inspections to ensure that the requirements for cleanliness are being met. Roof surface, building interiors, and grounds in work area shall be cleaned before close of work each day.

3.1.2 Contractor shall provide storage containers for all items awaiting removal from the site. Storage containers and locations shall be approved by the Roof Consultant and promptly disposed of when at capacity.

3.2 STORED MATERIALS

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

3.2.2 Contractor shall inspect all arrangements of materials stored on the Project site on a minimum weekly basis and shall service all arrangements in accordance with the requirements of paragraph 3.1.1 of this Section.

END OF SECTION 01560

SECTION 01610

STORAGE AND PROTECTION

PART 1 GENERAL

1.1 FACILITY PROTECTION

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, new materials etc.

1.1.3 Protect existing facilities from fire. Contractor shall provide suitable and adequate fire extinguishers conveniently located on the premises at staging areas, storage areas, and at areas of equipment. Competent operators shall be in attendance at all times and shall be properly trained or instructed in fire protection. At all times during the application of hot bitumen, appropriate fire extinguishers shall be located at the kettle and on the roof.

1.1.4 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.

1.1.5 Site and roof traffic shall be confined to work areas. Contractor shall be responsible for leaks that develop in traffic areas during and after Project completion. Grounds damaged by work shall be restored to pre-work condition and shall include, but are not limited to, hauling in new acceptable fill dirt material and reseeding of the affected site.

1.1.6 Contractor shall protect interior operations from adverse weather during roofing operations. This requirement extends beyond the immediate project scope of work to adjacent contiguous roof areas.

1.1.7 The Contractor is responsible and shall be held liable for any damages to the adjacent roof assemblies, 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. Restoration may be necessary to construction assemblies not specified in this project manual. In such cases, repair methods and materials are subject to approval by Owner.

1.1.8 The Contractor shall keep existing drainage facilities clear of debris during construction.

1.2 MATERIAL PROTECTION

1.2.1 Products shall be transported by methods which avoid damage. Damaged material shall be subject to rejection by the Roof Consultant.

1.2.2 Store roll good materials in covered trailers or trailers with materials covered with tarps.

1.2.3 Materials stored in open shall be placed on pallets with wood blocks underneath to provide ventilation.

1.2.4 It is the responsibility of the Contractor to ensure roofing material and other products are adequately protected from damage.

1.2.5 Damaged materials will be designated by spray painting and must be removed from the project site within 24 hrs.

1.3 STORAGE

1.3.1 Contractor shall be responsible for proper storage of equipment, materials, and devices furnished by themselves and/or their subcontractors and suppliers.

1.3.2 All storage areas are subject to approval by the Owner or their authorized representative.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01610

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 FINAL CLEANING

1.1.1 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.

1.1.2 Execute cleaning prior to final inspection.

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

1.1.4 Clean all roof areas and drainage systems. Clean interior and exterior surfaces exposed to view; remove stains and foreign substances. Such work shall be accomplished at no additional cost to the Owner.

1.1.5 Clean equipment as required.

1.1.6 Clean site; sweep paved areas; rake clean other areas.

1.1.7 All tools, equipment, construction materials, scrap, debris, and waste shall be removed from the project site.

1.1.8 Restore grass areas by filling ruts, compacting soil, raking, seeding, and fertilizing. Replace any damaged sidewalks or pavement.

1.1.9 Remove portable sanitary facilities from site. Clean and disinfect area as necessary to ensure sanitary health conditions.

1.2 FINAL INSPECTION

1.2.1 Roof Consultant's representative will conduct a final inspection with Owner's representative and the Contractor's representative.

1.2.2 Any scheduled inspection reports by the roof system manufacturer’s representative or Local Jurisdiction Inspectors, if required, shall be furnished prior to Final Inspection and Contract Closeout.

1.3 WARRANTIES AND BONDS

1.3.1 Refer to Section 01740 “Warranties and Bonds” for requirements.

1.4 CLOSE-OUT

1.4.1 Final payment will be made to the Contractor only after the following have been submitted. Please provide (3) copies of the following documents.

1.4.1.1 Certificate of Substantial Completion, AIA G704.

1.4.1.2 Architect’s Final Punch list executed by Contractor that all work has been complete.

1.4.1.3 List of Subcontractors by specialty, including address and telephone number.

1.4.1.4 Consent of Surety to Final Payment, AIA G707.

1.4.1.5 Contractor's Affidavit of Payment of Debts and Claims, AIA G706.

1.4.1.6 Contractor's Affidavit of Release of Liens, AIA G706A.

1.4.1.7 "No Asbestos" Certification (Statement on Contractor's letterhead that no asbestos containing materials were used in the completion of the Work.)

1.4.1.8 Contractor's 2-year Watertight warranty to Owner.

1.4.1.9 Roof Manufacturer’s 20-year NDL Labor & Material Warranty to Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01700

SECTION 01740

WARRANTIES, INSURANCE, AND BONDS

PART 1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Upon completion of the work and prior to the final payment, the Contractor shall submit the following items to the Roof Consultant.

1.1.1.1 Copies of all manufacturers' punch lists and documentation of completion.

1.1.1.2 Copies of all punch lists prepared by the Roof Consultant and documentation of completion.

1.1.1.3 Contractor’s 2-year Watertight warranty to Owner.

1.1.1.4 Roof Manufacturer’s 20-year NDL warranty to Owner.

1.1.1.5 Asbestos Free Warranty

1.2 RELATED SECTION

1.2.1 Submit all items required by this Section as part of Contract Closeout, Section 01700.

1.3 WARRANTIES

1.3.1 Contractor’s Warranty: Comply with the General Conditions of the Contract concerning warranties and bonds. The Contractor shall agree that the work covered under this Contract shall remain free from any water penetration and physical defects caused by defective workmanship or materials for a period of 2 years from the date of final acceptance by Owner. Warranty shall be in the form enclosed at the end of this section.

1.3.1.1 Emergency repairs to defects and leaks shall be performed within two working days 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 defects were caused by abuse, lightning, hurricane, tornado, hailstorm, or other unusual phenomena.

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

1.3.1.3 The warranties shall also state that the Owner has the right, at any time during the 2-year Contractor's warranty period and the Manufacturer'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 first two years of the warranty period shall be borne by the Contractor and action by the Owner shall not invalidate the warranty.

1.3.2 Roof Manufacturer’s Warranty: Contractor shall furnish Owner the Roof Manufacturer's No Dollar Limit Unlimited Roofing System Guarantee with flashing endorsement covering all workmanship and materials issued by the roofing materials manufacturer for a period of 20 years from the date of substantial completion.

1.3.3 Asbestos Free Warranty: Contractor shall obtain and submit an ASBESTOS FREE WARRANTY from each subcontractor, material supplier, and equipment manufacturer upon completion of the work and prior to final payment. Each shall be in the form of that found at the end of this section and shall be properly executed and printed on the Contractors’ or material and/or equipment suppliers’ standard letterhead.

1.4 INSURANCE AND BONDS

1.4.1 Reference Supplemental Conditions Page 8 Article 11 INSURANCE AND BONDS.

1.4.2 There is a requirement for Bid Bonds in an amount equal to 5% of the Contract Base Bid price issued by a surety authorized to do business in the State of South Carolina.

1.4.3 Successful Contractor shall be required to provide Performance Bond in the amount of 100% of the contract for construction issued by a surety authorized to do business in the State of South Carolina.

1.4.4 Successful Contractor shall be required to provide Labor and Materials Payment Bond in the amount of 100% of the contract for construction issued by a surety authorized to do business in the State of South Carolina.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 Roofing Installer’s Warranty and Asbestos Free Warranties

3.1.1 Following this section there are sample Roofing Installer’s Watertight Warranty and ASBESTOS FREE WARRANTY forms. Prior to final payment, submit these documents as written on the corporate letterhead of the appropriate party.

END OF SECTION 01740

ENCLOSURES: Contractor’s Two Year Warranty
ASBESTOS FREE WARRANTY

(CONTRACTOR'S LETTERHEAD)
TWO YEAR WARRANTY

Know all men by these presents, that we, (Insert Contractor Name), having installed gypsum thermal barrier, polyisocyanurate insulation, coverboard, two ply modified asphalt Built-Up Roofing (BUR) assembly, bituminous, metal and fluid applied flashings, sheet metal work and having accomplished certain other work on the **Roofing and HVAC Replacement Project at St. James Middle School** under contract between **Horry County Schools** and (Insert Contractor Name), warrant to **Horry County Schools** with respect to said work that for a period of two years from date of final acceptance of said work, the roofing systems including gypsum cover board, insulation, modified bitumen built-up roofing assembly, bituminous, metal and liquid applied flashings, sheet metal copings, expansion joints, primary and overflow scupper liners, and gutter and downspouts shall be absolutely watertight and free from all leaks, provided however that the following are excluded from this warranty:

a. Defects or failures resulting from abuse by the Owner.
b. Defects in design involving failure of (1) structural frame, (2) load-bearing walls, and (3) foundations.
c. Damage caused by fire, tornado, hurricane, acts of God, wars, riots, or civil commotion.

We, (Insert Contractor Name), 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 general practice.

We, (Insert Contractor Name), further agree that for a period of two 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 and loose membrane and/or metal flashings, sheet metal copings, scuppers, conductor heads, and outlets in a manner compatible to the system and acceptable under industry standards and general practice.

We, (Insert Contractor Name), also agree that the Owner has the right, at any time during the two-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 first two 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 _____, 20 ___.

CONTRACTOR: WITNESS:

_____ _____

by _____ _____
President (Owner) Notary Public

Asbestos Free Warranty

Owner: Horry County School District
Location of Buildings: 9775 St. James Road, Myrtle Beach, SC
Name of Buildings: St. James Middle School
Date of Substantial Completion: _____

Know all men by these presents that we, _____
(Contractor, Subcontractor, Material Supplier or Equipment Manufacturer)
having furnished labor, materials, equipment and/or supplies; accomplished roofing and HVAC replacement at the St. James Middle School including removals of existing roofing, flashings, and/or miscellaneous roof system components; and installation of new modified asphalt roof assembly with cap sheet surfacing, insulation, flashings and/or miscellaneous roof system components as under contract between:

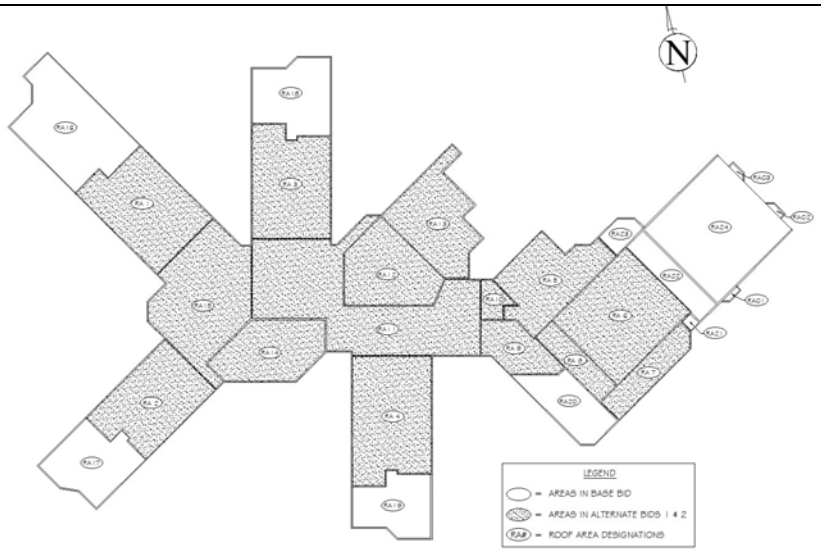
Horry County School District
(Owner and/or Contractor)
and

_____
(Contractor and/or Subcontractor, Material Supplier or Equipment Supplies)

warrant to Owner with respect to said work that no materials containing asbestos fibers were incorporated into the work, and that to our knowledge and belief, no materials containing asbestos remain in or are covered by the work.

Exceptions: _____
If there are no exceptions, state "No Exceptions" here.

_____



1 ST. JAMES MIDDLE SCHOOL WARRANTY PLAN

IN WITNESS WHEREOF, we have caused this instrument to be duly executed, this _____ day of _____, 20_____.

WITNESS:

_____ _____
Company

_____ _____
By Notary Public

SECTION 03511

CEMENTITIOUS WOOD FIBER PLANK

PART 1 GENERAL

1.1 SCOPE

1.1.1 The work consists of furnishing all labor, materials, accessories, and equipment necessary to cover all areas shown on the drawings and specified herein with Structural Cement Fiber Roof Deck tile including subpurlins, and grout.

1.2 QUALIFICATIONS

1.2.1 Tectum I tile as manufactured by Armstrong Building Solutions, 877-276-7876, shall be considered the standard of quality and performance for products proposed for use in this section. Tectum shall be composed of extra long, fine wood fibers bonded with waterproof portland cement.

1.2.2 MOISTURE/WATER WARRANTY: The manufacturer of the cement fiber roof deck shall provide a 15-year non-pro rata warranty against loss of flexural strength of the structural cement fiber panel (substrate) due to exposure to moisture or water. Said warranty to run from date of substantial completion of project, or occupation by Owner, whichever shall be later.

1.2.3 Substitutions: Contractor is invited to submit on the substitution sheet, alternate deck systems based on a PORTLAND CEMENT BASED structural cement fiber product. Submittal shall be accompanied by evidence that the proposed substitution meets or exceeds the structural, fire resistive, and acoustical performance of the product named as a standard of quality.

1.2.4 Submittals: Shop drawings, produced by the manufacturer of the decking, sufficiently detailed to show entire scope of work of this section. Manufacturer's technical literature sufficient to verify compliance with performance requirements.

1.3 DELIVERY AND STORAGE OF MATERIALS

1.3.1 Protect material from exposure to the elements. Material on site should be stored under cover on blocking. Portland cement bound structural cement fiber products may stain when exposed to rain or melting snow. Stained plank may require additional painting. Protect panels from soiling or abrasion on surfaces which will be exposed to view in the final construction. Discard damaged plank.

1.4 PRODUCT PROPERTIES

1.4.1 Structural cement fiber tile substrate shall be composed of extra long, fine wood fibers, and WATERPROOF PORTLAND CEMENT. Substrate shall be allowed by ICBO-ES for use where noncombustible materials are required by the U.B.C. Substrate shall be allowed by ICBO-ES, and SBCCI-PST & ESI, for use where fire retardant treated wood is required by the U.B.C. and Standard Building Code respectively. Substrate is also a 15-minute thermal barrier for foamed plastics in

accordance with U.B.C. standard 17-3, and the Standard Building Code. Substrate shall be classified in accordance with Federal Specification SS-S-118a as type IX, class 25. Tile shall be two and one half (2 ½) inches thick.

1.4.2 The roof deck will remain exposed in the finished building, and the Tectum roof deck shall be provided with a factory applied coat of primer paint. Light reflectance of mill primed deck shall not be less than 60%.

1.4.3 The roof deck panels shall have been tested in accordance with ASTM E84 and found to have a flame spread of 25 or less.

1.4.4 The roof deck panels shall have been tested in accordance with ASTM E119 and shall have been found to be a suitable 15-minute barrier for the protection of foamed plastic.

1.5 SYSTEM PERFORMANCE

1.5.1 The roof deck system supplied shall be capable of supporting a uniformly distributed load of 30# / SF (min.) over spans shown with deflection not to exceed L/180.

1.5.2 The roof deck system shall be capable of resisting 85# / SF wind uplift. In addition, the roof deck system as installed shall conform to a published U.L. Class 90 wind uplift design, specifically design # NM 508.

PART 2 PRODUCTS

2.1 TILE

2.1.1 The roof deck panels shall have rabbetted sides for use with subpurlins, and tongue and groove-ends where standard length tile are used, and end joints do not land over supports. Where end joints must occur over supports, ends of panels shall be square. All panels shall be 32" wide.

2.1.2 Bulb tee subpurlins shall be No. 218 as manufactured by Chicago Heights Steel and shall be mill primed red. Subpurlins shall have been selected to carry a uniformly distributed load of 95 p.s.f. when used on the longest span encountered on this project. Subpurlins shall be accurately spaced at least 32½" o.c. but not more than 33" o.c., with a deflection not to exceed (1/180) of the span.

2.1.3 Grout shall be 500 p.s.i. premixed gypsum concrete. Never add anything but clean water to gypsum concrete.

2.1.4 Install six (6) screws per tile. Screws shall be # 14 minimum, galvanized as protection against corrosion, or shall be sized as recommended by manufacturer to meet structural requirements. Screws shall be sized to penetrate and thread into steel. Washers for use with screws shall be 1.5" dia., min. 19ga., galvanized washers.

2.1.5 Perimeter support including framing for openings, support for longitudinal and transverse edges of decking, as well as support at all hips, valleys, and ridges, or other major discontinuities in the surface of the deck is existing to the best of our knowledge and belief. Roofing Contractor shall review existing support and notify architect prior to bidding if he thinks additional steel is necessary for the installation of the new roof deck panels. Additional steel support shall be provided and installed at the expense of the roofing contractor.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION

3.1.1 The roof deck installer shall inspect the structural support system before the start of this work. Any defects, deficiencies, or deviation from structural or approved fabricator's drawings, shall be corrected by the roofing contractor at this time.

3.1.2 When laying out deck panels, walk directly over structural supports until the deck has been securely attached. Avoid any unnecessary traffic on the deck. Where heavy objects are placed upon or transported over the deck or where material is repeatedly landed on the deck, planking or plywood shall be used to distribute the loads.

3.1.3 Roof deck panels shall be cut to fit neatly at walls or curbs and around openings as shown on approved shop drawings. Perimeter edges of roof deck, as well as cut edges, shall be supported by walls or other structural supports. Openings greater than 6" in any direction shall be framed by the steel erector or trade requiring the opening. Subpurlins should never be cut to make openings.

3.2 SYSTEM INSTALLATION

3.2.1 Installation of basic system.

3.2.1.1 Subpurlins:

a. Subpurlins are existing and if not damaged during removals may be reused. Existing and new subpurlins shall be installed for entire roof area before tile is laid. Position new subpurlins at minimum 32 ½” and maximum 33” OC. Weld on both sides at end bearing and on alternate sides at intermediate supports with 3/4" fillet welds.

3.2.1.2 Tile and Grout

a. Evenly space tile between bulb tees with tongue and groove end joints tightly nested or square cut ends tightly butted over supports. Mix gypsum concrete grout to a pourable consistency per the instructions on the bag. Then fill entire void around subpurlins with grout to the top of the tile. Strike off any excess grout flush with the top of the tile.

b. The deck shall be left ready for the roofer. Gypsum concrete grout should be used to feather out any irregularities.

END OF SECTION 03511

SECTION 05310

STEEL ROOF DECK

PART 1. GENERAL

1.1. SECTION INCLUDES:

1.1.1. Steel roof deck and accessories

1.2. RELATED SECTIONS

1.2.1. Section 01300 – Submittals

1.2.2. Section 07591 – Roof Removal and Preparation

1.3. REFERENCE STANDARDS

1.3.1. References in these specifications to standards, test methods and codes, are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which may be used as references throughout these specifications.

1.3.1.1. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3.1.2. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

1.3.1.3. ASTM A 924/A 924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

1.3.1.4. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

1.3.1.5. ASTM E 329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.3.1.6. AISI - North American Specification for the Design of Cold-Formed Steel Structural Members.

1.3.1.7. AWS D1.3 - Structural Welding Code - Sheet Steel.

1.3.1.8. Factory Mutual (FM) Guide Listing - FM Approval Guide, Building Materials

1.3.1.9. Factory Mutual (FM) loss Prevention Data Sheet 1- 29

1.3.1.10. SDI Code of Standard Practice - 2014

1.3.1.11. SDI RD - Standard for Steel Roof Deck

1.3.1.12. SDI RDDM - Roof Deck Design Manual

1.3.1.13. SDI MOC2 - Manual of Construction with Steel Deck

1.3.1.14. UL - Fire Resistance Directory.

1.4. DESIGN / PERFORMANCE REQUIREMENTS

1.4.1. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's North American Specification for the Design of Cold-Formed Steel Structural Members and SDI RDDM Roof Deck Design Manual.

1.4.2. Roof Decking:

1.4.2.1. Deck shall meet the minimum design gage and yield strength specified on the drawings, or meet minimum specified section properties at specified yield strength.

1.4.2.2. Whenever possible, the deck shall be multi-span.

1.4.3. Factory Mutual Guide Listing: Provide steel roof deck evaluated by FM and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.4.4. Fire-Test-Response Characteristics: Where indicated, provide steel deck units that are approved by UL, LLC and listed in the UL and ULC Fire Resistance Directories.

1.5. SUBMITTALS

1.5.1. Refer to Section 01300 of these Specifications for a Listing of Other Submittals required for this Project.

1.5.2. Product Data: Manufacturer's data sheets on each product to be used, including:

1.5.2.1. Deck property information for the proposed deck units as outlined in section 5.6 of SDI COSP-2014.

1.5.2.2. Preparation instructions and recommendations.

1.5.2.3. Storage and handling requirements and recommendations.

1.5.2.4. Erection instructions.

1.5.3. Shop Drawings: Show location, connections, bearing on supports, methods of anchoring, attachment of accessories, adjusting plate details and the manufacturer's erection instructions and pertinent details.

1.5.4. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.5.5. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6. QUALITY ASSURANCE

1.6.1. Manufacturer Qualifications: Member in good standing of Steel Deck Institute (SDI).

1.6.2. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

1.6.3. Welding: Qualify procedures and personnel according to AWS D1.3, Structural Welding Code - Sheet Steel.

1.7. DELIVERY, STORAGE, AND HANDLING

1.7.1. Store products in compliance with SDI MOC2

1.7.2. Separate sheets and store on dry wood sleepers; slope for positive drainage. Cut plastic wrap to encourage ventilation. Protect with a waterproof covering and ventilate to avoid condensation.

1.8. SEQUENCING

1.8.1. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

PART 2. PRODUCTS

2.1. MANUFACTURERS

2.1.1. Subject to compliance with requirements, manufacturers whose products may be included in the Work include, but are not limited to, the following:

2.1.1.1. Consolidated Systems, Inc.

2.1.1.2. Epic Metals Corp.

2.1.1.3. United Steel Deck, Inc.

2.1.1.4. Vulcraft, Division of Nucor

2.1.1.5. Wheeling Corrugating Co.

2.2. ROOF DECK

2.2.1. Steel Roof Deck - General: Fabricate deck to comply with SDI RD - Standard for Steel Roof Deck, with the minimum section properties indicated. Deck type and thickness shall be as indicated on the Drawings:

2.2.1.1. Type B Wide Rib deck is 1-1/2 inches deep and 36 inches wide with nested side laps (RAs 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, C1, C2, and C3).

2.2.2. Deck Materials

2.2.2.1. Sheet steel for galvanized deck shall conform to ASTM A 653/A 653M Structural Steel, with a minimum yield strength of 33 ksi (230 MPa) or other galvanized structural sheet steels or high strength low alloy steels in accordance with AISI S100, Section A2.

2.2.2.2. Sheet steel for uncoated or phosphatized top/painted bottom deck shall conform to ASTM A 1008 / A 1008M with a minimum yield strength of 33 ksi (230 MPa) or other structural sheet steels or high strength low alloy steels in accordance with AISI S100, Section A2.

2.2.2.3. Sheet steel for accessories shall conform to ASTM A 653/A 653M, Structural Steel for structural accessories, ASTM A 653/A 653M Commercial Steel for non-structural accessories, or ASTM A 1008 / A 1008M for either structural or non-structural accessories. Other structural sheet steels or high strength low alloy steels shall be permitted in accordance with AISI S100, Section A2. All sheet steel for accessories shall have a minimum specified yield strength of 33 ksi (230 MPa).

2.2.3. Deck Finish

2.2.3.1. Galvanized coating shall comply with ASTM A 924/A 924M with zinc coating as follows:

2.2.3.1.1. G60

2.2.3.2. Primer-painted finish gray on both the top and bottom sides.

2.3. ACCESSORIES

2.3.1. Column closures, end closures, side closures and cover plates shall be the standard type provided by the deck manufacturer unless indicated otherwise on the Drawings.

2.3.2. Galvanizing Repair Paint for Roof Decks: High-zinc-dust content paint for re-galvanizing welds in galvanized steel conforming to ASTM A 780.

2.3.3. Fasteners: As manufactured by Teks, Hilti, Buildex, Simpson Strong-Tie or approved equal.

2.3.3.1. Deck fasteners: #12 self-drilling screw.

2.3.3.2. Side lap fasteners: #10 self-drilling screw.

2.3.4. Flexible Closure Strips.

PART 3. EXECUTION

3.1. EXAMINATION

3.1.1. Confirm that all items to be removed, have been, and that appropriate substrate has been installed and appropriately attached to structure for support of the new steel roof deck.

3.1.2. Carefully inspect the roof deck. If, in the Contractor's opinion, there are areas of decking which require repair or replacement, notify Architect. Do not proceed with repair or replacement until directed by Architect. Correct all unsatisfactory substrate conditions prior to the application of new metal roof deck.

3.1.3. Application of new materials constitutes approval by the installing roofing contractor that the substrate conditions are satisfactory.

3.2. PREPARATION

3.2.1. Refer to Section 07591 for work required prior to installation of new roof assembly.

3.2.2. Clean deck surfaces and ribs thoroughly prior to installation.

3.2.3. Remove any existing deteriorated roof deck and replace with new decking to match existing profile and thickness. Maintain and submit daily log of deck replacement work.

3.2.4. Locate deck bundles to prevent overloading of support members.

3.3. INSTALLATION – GENERAL

3.3.1. Install deck panels and accessories in accordance with the Contract Documents approved installation drawings and requirements of this Section.

3.3.2. Place deck panels on structural supports and adjust to final position with ends aligned. Attach firmly to the supports immediately after placement in order to form a safe working platform.

3.3.3. Cut and neatly fit deck units and accessories around openings and other work projecting through or adjacent to the decking.

3.4. INSTALLATION – ROOF DECK

3.4.1. Install and fasten deck and accessories in accordance with the Contract Documents, approved installation drawings and requirements of ANSI/SDI RD.

3.4.2. Roof deck to be attached with 36/4 fastening pattern at interior supports of deck panel and at 6" O.C. around perimeter. Fastening to be made with #12 screws to supports with a minimum of (1) #10 sidelap fastener at 30" O.C., equally spaced between supports.

3.4.3. All roof deck shall be placed to provide a minimum (2) span condition.

3.4.4. End Bearing: Install deck ends over supports with a minimum end bearing of 1-1/2 inches (38 mm) unless otherwise shown on approved installation drawings.

3.4.5. Side Closures: Fasten to supporting structure and deck in accordance with the Contract Documents, approved installation drawings and requirements of ANSI/SDI RD.

3.4.6. Ridge and valley plates, flat plates at changes of deck direction and sump pans, shall be fastened to the deck in accordance with the Contract Documents, approved installation drawings and requirements of ANSI/SDI RD.

3.5. INSPECTION AND REPAIR

3.5.1. Before installation of the new roof assembly, the deck shall be inspected for tears, dents, or other damage that may prevent the deck from acting as a tight and substantial form. Replace decking which has been damaged or permanently deflected.

3.5.2. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint.

3.5.3. Repair Painting: Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

3.6. PROTECTION

3.6.1. Protect installed products until completion of project.

3.6.2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 05310

SECTION 05521

PIPE AND TUBE RAILING SYSTEMS

PART 1. GENERAL

1.1. SECTION INCLUDES:

1.1.1. Permanent roof edge protection.

1.1.1.1. Wall Mounted Guardrails on RA 6

1.2. RELATED SECTIONS

1.2.1. Section 01300 – Submittals

1.2.2. Section 07550 – Modified Bitumen Membrane Roofing

1.3. REFERENCES

1.3.1. American Society for Testing of Materials (ASTM):

1.3.1.1. ASTM A36 - Standard Specification for Carbon Structural Steel.

1.3.1.2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

1.3.1.3. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

1.3.2. Occupational Safety and Health Administration (OSHA):

1.3.2.1. 29 CFR 1910.21 - Scope and Definitions

1.3.2.2. 29 CFR 1910.28 - Duty to Have Fall Protection

1.3.2.3. 29 CFR 1910.29 - Walking Working Surfaces

1.3.2.4. 29 CFR-1910.30 - Training Requirements

1.5. SUBMITTALS

1.5.1. Refer to Section 01300 of these Specifications for a Listing of Other Submittals required for this Project.

1.5.2. Product Data: Manufacturer's data sheets for products and assemblies specified.

1.5.2.1. Preparation instructions and recommendations.

1.5.2.2. Storage and handling requirements and recommendations.

1.5.2.3. Cleaning methods.

1.5.3. Shop Drawings:

1.5.3.1. Indicate profiles, sizes, connections, size and type of fasteners, accessories.

1.5.3.2. Show location of rails and guardrails including plans, details of components and anchor details.

1.5.3.3. Field Verified Measurements: Verify dimensions indicated on Drawings.

1.5.4. Verification Samples: For each finish specified, two samples representing actual colors specified.

1.6. DELIVERY, STORAGE, AND HANDLING

1.6.1. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.

1.6.2. Store materials in manufacturer's original sealed, labeled packaging until ready for installation and in accordance with manufacturer's instructions. Protect finishes on rails and uprights from damage.

1.7. PROJECT CONDITIONS

1.7.1. Maintain environmental conditions, temperature, humidity and ventilation, within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7.2. Field Measurements: Where horizontal rails and uprights are indicated to fit to other construction, check actual dimensions or other construction by accurate field measurements prior to ordering and installation; show recorded measurements on final Shop Drawings.

1.8. SEQUENCING AND SCHEDULING

1.8.1. Coordinate fabrication and delivery schedule of handrails with construction progress and sequence to avoid delay of railing installation.

1.8.1.1. Where field measurements cannot be made without delaying the system fabrication and delivery, obtain guaranteed dimensions in writing by the Contractor and proceed with fabrication of products to not delay fabrication, delivery and installation.

1.9. WARRANTY

1.9.1. Warranty: Provide manufacturer's standard one year warranty against defects in materials and manufacturing.

PART 2. PRODUCTS

2.1. MANUFACTURERS

2.1.1. Acceptable Manufacturer: Leading Edge Safety, LLC, which is located at: 1345 Taney St.; North Kansas City, MO 64116; Toll Free Tel: 888-990-2990; Fax: 816-472-0822; Email: request info; Web: https://leadingedgesafety.net

2.1.2. Requests for substitutions will be considered in accordance with provisions of Section 01631 - Substitutions.

2.2. WALL MOUNT GUARD RAIL IBC 50; 50 LBS PER FOOT

2.2.1. Product: IBC Wall Mount Guardrail, Powder Coated Steel. Permanent full-perimeter fall protection, allowing direct mounting to interior parapet walls using a dual plate mounting system that assures water-tight installation. Backup plates, target patches, and upright plates creates a compression attachment to prevent water infiltration around mounting studs. Powder coated steel colors available to match Kynar sheet metal or other building components and RAL colors.

2.2.1.1. Standards:

2.2.1.1.1. ICC Building Codes: Meets and exceeds 50 lbs per ft (74.4 kg per m).

2.2.1.1.2. Meets and exceeds OHSA Standard 29 CFR 1926.501, 1926.502, 1910.29, Cal-OSHA, 1620,1621, 3209, 3210.

2.2.1.1.3. ANSI/ASEE A1264.1-2007.

2.2.1.1.4. USACE EM 385-1-1 (21.E.01 a-c).

2.2.1.2. Materials:

2.2.1.2.1. Uprights: 1.625 x 0.25 inch (41 x 6 mm) steel tube per ASTM A-513-5-08A DOM Grade 1026.

2.2.1.2.2. Mounting Bracket: 3/16 inch (0.28 mm) steel plate per ASTM A36 bracket with pre-punched holes for mounting stud attachment.

2.2.1.2.3. Horizontal Rails: 1.625 x 0.065 inch (41 x 1.6 mm) and 1.375 x .065 inch (35 x 1.6 mm) per ASTM A-513 DOM Grade 1020 steel tube adjustable slide rails.

2.2.1.3. Sizes:

2.2.1.3.1. Uprights: Custom designed per project to OSHA Standards and IBC code requirements.

2.2.1.3.2. Horizontal Rails: 5 ft (1524 mm) on center; 70 to 43 inch (1778 to 1092), 43 to 29 inch (1092 to 737 mm) adjustable.

2.2.1.3.3. Outside Corner: 20.5 inch (521 mm) on center.

2.2.1.3.4. Inside Corner: 12.5 inch (218 mm) on center. Inside Corner.

2.2.1.4. Weight: All weights are approximate.

2.2.1.4.1. Uprights: 25 lbs (11.3 kg).

2.2.1.4.2. Horizontal Rails: 1 lbs per linear ft (14.6 N per m).

2.2.1.4.3. Corners: 2 lbs (0.9 kg).

2.2.1.5. Hardware: 3/8-16 inch x 1 inch (25 mm) zinc plated steel. Consult LES for approved structural attachment fasteners.

2.2.1.6. Labels: Applicable safety warnings and manufacturer's contact information.

2.2.1.7. Finish: Powder coated steel.

2.2.1.8. Colors: As determined by the Owner and Consultant from Manufacturer's range.

PART 3. EXECUTION

3.1. EXAMINATION AND PREPARATION

3.1.1. Inspect and prepare substrates and nailers using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions. Verify that nailers and other structural components of the building are securely fastened and capable of withstanding loads applied by the guardrail system.

3.1.2. Do not proceed with installation until substrates and nailers have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

3.1.3. If preparation is the responsibility of another installer, notify Consultant in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2. INSTALLATION

3.2.1. Install in accordance with manufacturer's instructions including the following.

3.2.2. Permanent Roof Edge Protection:

3.2.2.1. Set uprights, horizontal rails and corners accurately in location, alignment and elevation, measured from established lines and levels and per installation drawings.

3.2.2.2. Install fasteners as recommended by manufacturer in holes provided on the upright bracket.

3.2.2.3. Inspect final installation and test for capacity in accordance with manufacturer's recommendations.

3.2.3. Wall Mount Guardrail shall provide water-tight installation through wall flashings on parapet walls with the use of backup plates, target patches and wall mount brackets. Target patches shall be field fabricated to fit around backup plate mounting studs and provide roof manufacturers recommended seam width around perimeter of target patch. Mounting studs shall be sealed behind target patch with non-curing butyl or manufacturers recommended sealant.

3.3. PROTECTION

3.3.1. Protect installed products until completion of project.

3.3.2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 05310

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

RELATED DOCUMENTS

1.1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1 This Section includes but is not limited to the following:

1.2.1.1 Wood blocking.

1.2.1.2 Plywood blocking.

1.2.2 Related Sections include the following:

1.2.2.1 Division 7 Section 07550 "Modified Bitumen Membrane Roofing".

1.2.2.2 Division 7 Section 07591 “Reroofing Removal & Preparation”.

1.3 DEFINITIONS

1.3.1 Lumber grading agencies, and the abbreviations used to reference them, include the following:

1.3.1.1 NLGA - National Lumber Grades Authority.

1.3.1.2 SPIB - Southern Pine Inspection Bureau.

1.3.1.3 ALSCBR - American Lumber Standards Committee Board of Review

1.4 SUBMITTALS

1.4.1 Material Certificates: Prior to start of work, submit manufacturer’s Certificate of Compliance with the material specifications of this section, signed by a responsible officer of the manufacturing firm and notarized.

1.4.1.1 Certify as to Treatment Process; Treatment Chemical; and Chemical Retention.

1.5 QUALITY ASSURANCE

1.5.1 Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated as documented.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.1.1 Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1 Lumber:

2.1.1.1.1 Boise Cascade Corporation.

2.1.1.1.2 Georgia-Pacific Corporation.

2.1.1.1.3 Louisiana-Pacific Corporation.

2.1.1.1.4 International Paper Corp.

2.2 WOOD PRODUCTS, GENERAL

2.2.1 Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

2.2.1.1 Factory mark each piece of lumber with grade stamp of grading agency.

2.2.1.2 Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified.

2.2.1.3 Provide dressed lumber, S4S, unless otherwise indicated.

2.2.1.4 Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

2.3 MISCELLANEOUS LUMBER

2.3.1 For concealed boards, provide lumber with 19 percent maximum moisture content and of the following species and grades:

2.3.1.1 Mixed southern pine, No. 2 grade; SPIB.

2.3.2 Do not use material that is warped or does not comply with requirements for untreated material.

2.3.3 Application: Treat all rough carpentry for use “above grade” to include, but not limited to, the following:

2.3.3.1 Nailers, curbs, blocking, stripping, and similar members in connection with roofing, flashing, and waterproofing.

2.4 WOOD-PRESERVATIVE-TREATED MATERIALS (In Contact with Concrete or Masonry)

2.4.1 Preservative Treatment by Pressure Process: AWPA C-2 (Ground Contact lumber) and AWPA C9 (plywood).

2.4.2 Preservative Chemicals: Acceptable to authorities having jurisdiction the following or approved equal:

2.4.2.1 Alkaline Copper Quaternaries (ACQ-C or D).

2.4.2.2 Copper Azole (CA-B)

2.4.3 Kiln-dry material after treatment to maximum moisture content of 19 percent for lumber and for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

2.4.4 Retention of preservative shall be 0.40 pcf for ACQ Treatment or 0.21 pcf for CA Treatment.

2.4.5 Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

2.4.6 Application: Treat all rough carpentry for use “in ground contact” to include, but not limited to, the following:

2.4.6.1 Wood nailers, parapet furring, blocking, furring, stripping, and similar concealed members in direct contact with masonry or concrete.

2.5 PLYWOOD BACKING PANELS AND BLOCKING

2.5.1 Miscellaneous Backing Panels: CDX, DOC PS 1, Exterior Exposure 1, C-D Plugged, ¾-inch thickness indicated or, if not indicated, not less than 1/2 inch (12.7 mm) thick.

2.5.2 Sheathing: CDX, DOC PS 1, Exterior Exposure 1, C-D Plugged, thickness indicated or, if not indicated, not less than 3/4 inch (12.7 mm) thick.

2.5.3 Do not store sheathing outdoors or expose to moisture.

2.6 FASTENERS

2.6.1 Reference Division 7 Section 07591 “Reroofing Removal & Preparation”.

2.6.2 All fasteners, connections, clips or strap anchors for wood and plywood shall be either hot-dipped zinc coated galvanized steel or stainless steel (Type 304 or 316 SS).

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

3.1.1 Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate blocking and similar supports to comply with requirements for attaching other construction.

3.1.2 Separate any aluminum metal component from preservative treated lumber with minimum divorcing layer of 15 lb asphalt saturated building paper. Use appropriate ring-shank, stainless steel fasteners.

3.1.3 Never use aluminum fasteners with preservative treated wood. Only use hot-dipped galvanized or stainless-steel fasteners with treated wood.

3.1.4 All wood nailers shall be of sufficient thickness so as to finish flush with the adjacent insulation. Securely anchor wood blocking with appropriate fasteners a minimum of two (2) for every 16”. Perimeter wood blocking and blocking at openings shall be a minimum nominal width of 6”.

3.1.5 Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

3.1.6 Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

3.1.6.1 Published requirements of metal framing anchor manufacturer.

3.1.6.2 Table 2304.10.1, "Fastening Schedule," in the International Building Code.

3.1.7 For wood to wood connections use ring shanked, hot dipped galvanized nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

END OF SECTION 06100

SECTION 07550

MODIFIED BITUMEN MEMBRANE ROOFING

PART 1. GENERAL

1.1. SECTION INCLUDES:

1.1.1. Base Sheet Application

1.1.2. Two Ply Roof Membrane Application

1.1.3. Roof Flashing Application

1.1.4. Incorporation of Sheet Metal Flashing Components and Roofing Accessories into the Roof System

1.2. RELATED SECTIONS

1.2.1. Section 01300 – Submittals

1.2.2. Section 06100 – Rough Carpentry

1.2.3. Section 07620 – Sheet Metal Flashing and Trim

1.2.4. Section 07591 – Roof Removal and Preparation

1.3. REFERENCE STANDARDS

1.3.1. References in these specifications to standards, test methods and codes, are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which may be used as references throughout these specifications.

1.3.1.1. ASTM American Society for Testing and Materials, Philadelphia, PA

1.3.1.2. FM Factory Mutual Engineering and Research, Norwood, MA

1.3.1.3. NRCA National Roofing Contractors Association, Rosemont, IL

1.3.1.4. OSHA Occupational Safety and Health Administration, Washington, DC

1.3.1.5. SMACNA Sheet Metal and Air Conditioning Contractors National Association,Chantilly, VA

1.3.1.6. UL Underwriters Laboratories, Northbrook, IL

1.4. DESCRIPTION OF WORK

1.4.1. Description of Work: Work required in this specification is referenced below and is based on Siplast Roofing Systems Products and Specifications. A SBS modified bitumen roof system from Johns Manville (JM) or Soprema (S) installed in accordance with the requirements and procedures listed in this Specification will be accepted. Acceptable JM and Soprema products are listed in parentheses following listed Siplast products in Part 2 of this Spec Section.

1.4.1.1. Roof System:

1.4.1.1.1. Hot/Cold Applied Modified Bitumen such as:

1.4.1.1.1.1. Siplast Paradiene 20/30 IH-A

1.4.1.1.1.2. Johns Manville 2CID-CA

1.4.1.1.1.3. Soprema IS-25/41 SG

1.5. SUPERVISION

1.5.1. Contractor shall assign a full-time, English speaking, qualified Roofing Sup't. to the project to coordinate the various aspects of the work; to provide Quality Control Services for the project; and to serve as liason with the Owner's representative.

1.5.2. The roofing crew shall be supervised at all times by Contractor's full-time, English speaking Foreman.

1.6. SUBMITTALS

1.6.1. Refer to Section 01300 of these Specifications for a Listing of Submittals required for this Project.

1.7. QUALITY ASSURANCE

1.7.1. Acceptable Products: Primary roofing products, including each type of sheet, all manufactured in the United States, shall be supplied by a single manufacturer which has been successfully producing the specified types of primary products for not less than 10 years. The primary roofing products shall have maintained a consistent composition for a minimum of five years.

1.7.2. Product Quality Assurance Program: Primary roofing materials shall be manufactured under a quality management system that is monitored regularly by a third party auditor under the ISO 9001:2000 audit process. A certificate of analysis for reporting/confirming the tested values of the actual material being supplied for the project will be required prior to project close-out.

1.7.3. Roof System Manufacturer Quality Control Inspections: Provide as a part of the Contractor's Base Bid price the following level of roofing system inspections by

the roofing system manufacturer during the installation of the new roofing system:

1.7.3.1. Attend the Pre-Roofing Conference with Owner's Agent, Roof Consultant, Installing Roofing Contractor, Manufacturer's Representative and General Contractor.

1.7.3.2. Manufacturer's Inspector shall be present along with Roof Consultant at initial project startup, 50% and 100% inspections.

1.7.3.3. Manufacturer's Inspector shall notify the Roof Consultant prior to performing field inspections and provide copies of the Inspector's field report to the Roof Consultant after each site visit.

1.7.4. Work found in violation of the Specifications, or not in conformance with acceptable workmanship practices/standards, shall be subject to rejection including complete removal and replacement with new materials at Contractor's expense.

1.7.5. Failure of Owner or Roof Consultant to discover or reject defective work, or work not in accordance with the Contract, shall not be deemed an acceptance thereof, or a waiver of Owner's rights to Contractor's compliance with the Contract or performance of the work, or any part thereof. No partial or final payment, or partial or entire occupancy, by Owner shall be deemed to be an acceptance of work or of material which is not strictly in accordance with the Contract, nor shall it be deemed a waiver by Owner or any of Owner's rights pursuant to this Contract or otherwise.

1.7.6. Contractor may be made to uncover work in-place to determine the quantity and quality of material and workmanship. Contractor photographs may or may not be accepted to validate fasteners, fastener frequency, unit price work and other elements of the work concealed by project finishes.

1.7.7. Owner Responsibilities: Owner will provide inspections during the work. Such inspections may be daily or periodic.

1.7.8. Contractor Responsibilities: Unless otherwise indicated, provide quality-control inspections with Contractor's own work force. Repair or replace nonconforming work.

1.7.8.1. Associated Services: Cooperate with agencies performing inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Provide the following:

1.7.8.1.1. Access to the Work.

1.7.8.1.2. Incidental labor and materials necessary to facilitate inspections.

1.7.8.2. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum

of delay and to avoid necessity of removing and replacing construction to accommodate inspections.

1.7.8.3. Agency Approvals: The proposed roof system shall conform to the following requirements. No other testing agency approvals will be accepted. Underwriters Laboratories Class A acceptance of the proposed roofing system, including cold adhesive, without additional requirements for gravel or coatings.

1.7.8.4. Acceptable Contractor: Contractor shall have a minimum of 4 years experience in successfully installing the same or similar roofing materials and be certified in writing by the roofing materials manufacturer to install the primary roofing products.

1.7.8.5. Scope of Work: The work to be performed under this specification shall include but is not limited to the following: Attend necessary job meetings and furnish competent and full time supervision, experienced roof mechanics, all materials, tools, and equipment necessary to complete, in an acceptable manner, the roof installation in accordance with this specification. Comply with the latest written application instructions of the manufacturer of the primary roofing products. In addition, application practice shall comply with requirements and recommendations contained in the latest edition of the Handbook of Accepted Roofing Knowledge (HARK) as published by the National Roofing Contractor's Association, amended to include the acceptance of a phased roof system installation.

1.7.8.6. Local Regulations: Conform to regulations of public agencies, including any specific requirements of the city and/or state of jurisdiction, including, but not limited to, permitting of work and licensing of contractors performing the work

1.7.8.7. Manufacturer Requirements: Ensure that the primary roofing materials manufacturer provides direct trained company personnel to attend necessary job meetings, perform periodic inspections as necessary, and conducts a final inspection upon successful completion of the project.

1.8. PRODUCT DELIVERY STORAGE AND HANDLING

1.8.1. Delivery: Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.

1.8.2. Storage: Store materials out of direct exposure to the elements. Store roll-goods on a clean, flat and dry surface. All material stored on the roof overnight shall be stored on pallets. Rolls of roofing must be stored on ends. Store materials on the roof in a manner so as to preclude overloading of deck and building structure. Store materials such as solvents, adhesives and asphalt cutback products away from open flames, sparks or excessive heat. Cover all material using a breathable cover such as a canvas. Polyethylene or other non-breathable plastic coverings are not acceptable.

1.8.3. Handling: Handle all materials in such a manner as to preclude damage and contamination with moisture or foreign matter. Handle rolled goods to prevent damage to edges or ends.

1.8.4. Damaged Material: Any materials that are found to be damaged or stored in any manner other than stated above will be automatically rejected, removed and replaced at the Contractor's expense.

1.9. PROJECT/SITE CONDITIONS

1.9.1. Requirements Prior to Job Start

1.9.1.1. Pre-Roofing Conference: Roofing Contractor shall schedule a pre-roofing construction conference to be conducted by the Roof Consultant or his Representative, and attended by the installing roofing contractor, the roofing system manufacturer, the Owner’s representative and sub-contractors engaged in the work of this project.

1.9.1.2. Notification: Give a minimum of 5 days notice to the Owner, Roof Consultant, and Manufacturer prior to commencing any work and notify all parties on a daily basis of any change in work schedule.

1.9.1.3. Permits: Obtain all permits required by local agencies and pay all fees which may be required for the performance of the work.

1.9.1.4. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.

1.9.2. Asbestos Products

1.9.2.1. No products containing asbestos fibers are present in the work covered in the Base Bid at St. James Middle School.

1.9.2.2. No Asbestos Containing Materials are to be incorporated into the work as a part of this contract. No existing asbestos containing material is to be left or incorporated into the work of this contract.

1.9.2.3. In the event the Contractor finds asbestos containing materials not previously identified, then Contractor shall stop all work in the affected area and notify the Owner and Roof Consultant. Contractor shall provide all materials necessary to temporarily dry-in the affected area in the Base Bid. Additional work caused by the discovery, if authorized by the Owner, will be handled as a Change Order to this Contract.

1.9.3. Environmental Requirements

1.9.3.1. Precipitation: Do not apply roofing materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials, applied roofing, and

building interiors are protected from possible moisture damage or contamination.

1.9.3.2. Temperature Restrictions - cold adhesive: At low temperatures, the specified cold adhesive becomes more viscous, making even distribution more difficult. The optimal temperature of the adhesive at point of application is 70°F (21°C). To facilitate application when ambient temperatures are below 50°F (10°C), store the adhesive and roll goods in a warm place immediately prior to use. Suspend application in situations where the adhesive cannot be kept at temperatures allowing for even distribution. Roll or broom base ply and finish ply sheets across their full width to ensure contact with the underlying adhesive.

1.9.4. Protection Requirements

1.9.4.1. Membrane Protection: Provide protection against staining and mechanical damage to newly applied roofing and adjacent surfaces throughout this project.

1.9.4.2. Limited Access: Prevent access by the public to materials, tools and equipment during the course of the project.

1.9.4.3. Debris Removal: Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.

1.9.4.4. Site Condition: Complete, to the Owner's satisfaction, all job site clean-up including building interior, exterior and landscaping where affected by the construction.

1.9.4.5. Facility Protection:

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

1.9.4.5.2. 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, new materials etc.

1.9.4.5.3. Protect existing facilities from fire. Contractor shall provide suitable and adequate fire extinguishers conveniently located on the premises at staging areas, storage areas and at areas of equipment. Competent operators shall be in attendance at all times and shall be properly trained or instructed in fire protection.

1.9.4.5.4. 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.

1.9.4.5.5. Site and roof traffic shall be confined to work areas. Contractor shall be responsible for leaks that develop in traffic areas during and after Project completion.

1.9.4.5.6. Contractor shall protect interior operations from adverse weather during roofing operations. This requirement extends beyond the immediate project scope of work to adjacent contiguous roof areas.

1.9.4.5.7. The Contractor is responsible and shall be held liable for any damages to the adjacent roof assemblies, 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. Restoration may be necessary to construction assemblies not specified in this project manual. In such cases, repair methods and materials are subject to approval by Owner.

1.9.4.6. The Contractor shall keep existing drainage facilities clear of debris during construction.

1.10. CONTRACTOR'S TWO YEAR WARRANTY

1.10.1. All new materials and workmanship covering work provided under this section of the specifications shall be guaranteed in writing by the contractor to maintain in a watertight condition without cost to the Owner for a period of two (2) years after date of substantial completion.

1.11. MANUFACTURER'S 20 YEAR GUARANTEE/WARRANTY

1.11.1. Roof System Guarantee: Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the roof system manufacturer's 20 year, No Dollar Limit, Labor and Materials Total Roof System Guarantee. The roof system guarantee shall include both the modified bitumen roofing, surfacing, and flashing membranes, catalyzed resin flashing system, roof insulation, insulation overlay, insulation adhesives, insulation fasteners, flashing adhesives, and accessory roofing materials.

1.11.2. All repair or replacement costs covered under the guarantee shall be borne by the roofing membrane manufacturer. The guarantee shall be a term type, without deductibles or limitations on coverage amount, and be issued at no additional cost to the Owner.

PART 2. PRODUCTS

2.1. ROOFING SYSTEM ASSEMBLY/PRODUCTS

2.1.1. Gypsum Thermal Barrier

2.1.1.1. 5/8” thick, Type X, gypsum sheathing with a moisture resistant, non-combustible core and moisture resistant paper facer on both sides, such as ToughRock® Fireguard X® sheathing, as manufactured by Georgia Pacific.

2.1.2. Roof Insulation

2.1.2.1. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

2.1.2.2. Polystyrene Board Insulation: ASTM C 578, Type II, 1.5# Nominal Density.

2.1.2.2.1. Manufacturers: Advanced Building Technologies, Inc. (www.abtfoam.com)

2.1.2.3. Flat Expanded Polystyrene Insulation: Where deck slopes in insulation, use two layers of 1.5” flat insulation. Use monolithic board only. Factory laminated board is not acceptable. Maximum board size: 4’x8’x1.5”.

2.1.2.4. Flat Expanded Polystyrene Insulation: Where deck slopes in structure, for metal deck use three layers of 1.5” flat insulation. For cementitious wood fiber deck, use two layers of 1.5” flat insulation. Use monolithic board only. Factory laminated board is not acceptable. Maximum board size: 4’x8’x1.5”.

2.1.2.5. Tapered Expanded Polystyrene Insulation: On designated roof areas, at upslope side of drain valleys, provide factory-tapered polyisocyanurate roof insulation boards fabricated to ¼” per foot slope, with 1/2” starting thickness, as indicated in Project Drawings. Provide factory-tapered expanded polystyrene insulation boards fabricated to slope of ½ inch per 12 inches at all wall backslopes, saddles and crickets. Use monolithic board only, factory laminated board is not acceptable.

2.1.2.6. Gypsum Overlayment (Base Bid and Alternate No. 1) – Georgia Pacific DensDeck Prime: a minimum 1/4" thick glass mat faced gypsum board with non-asphaltic coating, specifically designed for use as an overlayment or coverboard furnished by the manufacturer as part of the guaranteed roof system (USG Securock). Must meet or exceed a minimum compressive strength of 150 psi. Maximum board size: 4’x8’x1/4”.

2.1.2.7. Gypsum Overlayment (Alternate No.2)– Georgia Pacific DensDeck Prime: a minimum 1/2" thick glass mat faced gypsum board with non-asphaltic coating, specifically designed for use as an overlayment or coverboard furnished by the manufacturer as part of the guaranteed roof system (USG Securock). Must meet or exceed a minimum compressive strength of 150 psi. Maximum board size: 4’x8’x1/2”.

2.1.2.8. Tapered Edge Strips: Wood fiber in full range as provided by Manufacturer from ½ inch to 2-inch at thick edge; Provide 0" – ½" x 6" tapered edge strip at leading edge of tapered insulation saddles.

2.1.2.9. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping around fixed equipment and to gutters. At cricket conditions, fabricate to slopes double the normal slope of the roof.

2.1.2.10. Cant Strips: Siplast: Mineral perlite board cut to fit at 45 degrees with 5" face.

2.1.3. Base Ply

2.1.3.1. Siplast Paradiene 20: 62# / 100 sq. ft. minimum weight, applied to base sheet (JM: DynaBase; S: Elastophene Sanded).

2.1.4. Finish Ply

2.1.4.1. Siplast Paradiene 30 FR CR, white: 75# / 100 sq. ft. minimum weight, applied to Base Ply (JM: DynaGlas FR CR; S: Elastophene LS FR GR SG).

2.1.5. Flashing Membrane

2.1.5.1. Siplast Veral Aluminum: aluminum clad asphalt elastomer sheet: 96# / 100 sq. ft. minimum weight, applied with solvent-free adhesive (JM: DynaClad; S: Sopralast 50 TV ALU sanded).

2.1.6. Fluid Applied Flashing Systems

2.1.6.1. Siplast Parapro 123 Flashing System: A Catalyzed Acrylic Resin Flashing System: A specialty flashing system consisting of a liquid-applied, fully reinforced, multi-component acrylic membrane installed over a prepared or primed substrate. The flashing system consists of a catalyzed acrylic resin primer, basecoat and topcoat, combined with a non-woven polyester fleece. The resin and catalyst are pre-mixed immediately prior to installation. The use of the specialty flashing system shall be specifically approved in advance by the membrane manufacturer for each application. (JM: PMMA Flashing; S: Alsan RS 230 Flashing).

2.2. ASPHALT MATERIALS

2.2.1. Asphalt Primer: ASTM D41.

2.2.2. Roofing Asphalts: ASTM D312, Type III: Steep Grade;
ASTM D312, Type IV: Extra Steep Grade.

2.3. AUXILIARY ROOFING MATERIALS

2.3.1. Adhesives

2.3.1.1. Adhesive for Membrane Plies: Siplast PA-311 M Adhesive. (JM: MBR Cold Application Adhesive; S: Colply Adhesive VOC).

2.3.1.2. Adhesive for Membrane Plies at Pipe Penetrations Receiving Catalyzed Resin Flashing System: Siplast Solvent Free Adhesive. (JM: MBR Cold Application Adhesive; S: Colply Adhesive VOC).

2.3.2. Bituminous Cutback Materials

2.3.2.1. Mastic: Siplast PA-1021 Plastic Cement (JM: MBR Utility Cement; S: FM Adhesive (VOC) Trowel Grade)

2.3.3. Sealant at Membrane/metal junctions:

2.3.3.1. Siplast PS-304 Elastomeric Sealant

2.3.4. Reflective Coating for Liquid Applied Membrane and Adhesive Overruns:

2.3.4.1. Siplast #11 Roofing Granules (JM: Mineral Granules white; S: SG Granules).

2.3.5. Walk Pad:

2.3.5.1. At locations designated on Roof Plan:

2.3.5.1.1. Industrial Anti Fatigue Mat, Wet Areas, Size 38 x 64 In, Color Black, Orange Border, 7/8 In Thick Rubber

Item #4YJ18 as distributed by Grainger

2.3.5.2. At HVAC units, gas pipe supports and condensate drain supports:

2.3.5.2.1. Siplast Paradiene 40 FR, white: 99# / 100 sq. ft. minimum weight, applied to Cap Sheet with cold adhesive and heat welded laps (JM: DynaKap FR; S: Elastophene LS FR GR SG).

2.3.6. Condensate Drain Support:

2.3.6.1. A pipe support with “strut” used to support roof-mounted electrical conduit, solar piping, gas pipes, and other mechanical piping, such as MIRO Model 1.5 supports as manufactured by MIRO Industries, Sandy, Utah, 800-768-6978.

2.3.7. Gas Pipe Supports:

2.3.7.1. A "roller-bearing", "clevis hanger", or "band hanger" pipe support, used to support roof-mounted gas pipes, such as MIRO 3-RAH-12 supports as manufactured by MIRO Industries, Sandy, Utah, 800-768-6978.

2.4. ROOF ACCESSORIES

2.4.1. Insulation Fasteners for Metal Roof Decks: Insulation fasteners shall be approved and furnished by the manufacturer of the selected roof system. Fasteners shall be treated with a corrosion resistant coating exceeding FM Approval Standard #4470 and shall be installed with 3” diameter, round, premium Galvalume metal plates.

2.4.2. Insulation Fasteners for Cementitious Wood Fiber Roof Decks: Insulation fasteners shall be approved and furnished by the manufacturer of the selected roof system. Fasteners shall be treated with a corrosion resistant coating exceeding FM Approval Standard #4470 and shall be installed with 3” diameter, round, premium Galvalume metal plates as Lite-Deck Fasteners and Plates as manufactured by OMG Roofing Products.

2.4.3. Capped Nails: Hot-dip galvanized ring shank or Stainless Steel ring shank nail as manufactured by Maze Nails or Simplex.

2.4.4. Fasteners for miscellaneous attachments not specified: Hot-dipped galvanized Ring Shank or Stainless Steel Roofing Nails as mfg. by Maze Nails. Only stainless steel nails may be used in conjunction with aluminum sheet and aluminium fabrications.

2.4.5. Masonry Expansion Fasteners: Rawl Zamac Nailin® drive anchor w/ Type 304 stainless steel nail ¼” x 1 ¼”.

PART 3. EXECUTION

3.1. PREPARATION

3.1.1. Refer to Section 07591 for work required prior to removal of existing roof system, and preparations required to receive new roofing.

3.1.2. General: After removal of existing roof system and deck preparation is complete, remove all dirt, dust, debris and foreign substances from roof deck and ribs of roof deck, prior to commencement of roofing.

3.1.3. Where exposed, examine roof deck to verify deck is in sound condition without visible damage or rust. Repair or replace existing roof deck as specified in Section 07591 of these specifications.

3.1.4. Examine any exposed metal roof deck at roof perimeter to confirm edge of roof deck is fastened to structure at maximum 6” centers. Install missing fasteners and replace damaged fasteners at the perimeter of all roof areas as specified in Section 07591 of these specifications.

3.2. GENERAL ASPHALT APPLICATION

3.2.1. Do not apply materials when surfaces are wet or damp, over dust, dirt, or any other foreign matter. Foaming of hot bitumen at the point of application is evidence that the substrate is too wet for the proper application of materials.

3.2.2. Do not apply bituminous materials when the ambient air temperature is below 40°F unless equipment can be operated and materials maintained within the specified temperature ranges and without damage to materials, and then only with the approval of the Roof Consultant. Follow manufacturer's cold weather application requirements.

3.2.3. Perform only such amount of reroofing work that can be completed by the end of each workday.

3.2.4. Protect edges and incomplete flashings against water infiltration with night seals and other temporary measures. Remove end of day cut-offs and temporary measures prior to resuming roofing application. Step insulation at night seals.

3.2.5. Maintain the following temperature ranges at kettles and handling equipment at all times during the application of bitumen:

Bitumen	Kettle Temperature °F	Handling Equip. Temperature °F
Type III Asphalt	500 Maximum	400 to 425
Type IV Asphalt	500 Maximum	400 to 475

Kettles must be equipped with working thermometers or provide hand held thermometer for use by kettle operator. Hand held readings shall be taken from opposite side furthest from the burner stacks or at the draw-off spigot.

Kettle temperature shall be maintained below asphalt flash point (FP).

At no time shall kettle temperature meet or exceed FBT for more than two hours.

3.2.6. Prime (1 gal. / 100 SF) all concrete, masonry and wood surfaces that are to receive hot asphalt or bituminous cements and allow to dry thoroughly before application of bitumen.

3.2.7. Prior to application of new bituminous materials, prime with asphalt primer and allow to thoroughly dry all metal surfaces that receive hot asphalt or bituminous cements.

3.2.8. Provide additional quantities of asphalt as may be required by the roofing system manufacturer in excess of those specified herein in order to comply with manufacturer's warranted systems at no additional cost to the Owner.

3.2.9. Asphalts shall be certified in writing from the roofing system manufacturer that they are approved for use in the manufacturer's roofing system.

3.2.10. Thoroughly hand broom all plies to eliminate voids underneath the membrane ply and so that all edges are tightly adhered to asphalt.

3.3. GENERAL INSULATION INSTALLATION

3.3.1. Minimum required roof insulation 4 feet from roof drain valley or building perimeter shall be R-21, as required by ASHRAE 90.1-2007 and current building code. In no case shall the minimum R-Value be less than that stated on Form F-3 on the Key Plan for each construction type.

3.3.2. Edges of adjacent insulation boards shall be in moderate contact, without forcing.

3.3.3. Gaps in insulation joints over ¼" wide shall be filled.

3.3.4. Broken corners and edges of any insulation board shall be cut out and repaired with square-cut pieces of insulation no less that 8" x 8" in size.

3.3.5. Insulation boards shall be cut neatly to fit tight against vertical surfaces.

3.3.6. Insulation surface shall present a smooth surface to receive the roof membrane.

3.3.7. All joints of insulation board layer above base layer insulation shall be offset 24" from joints in base layer or fill insulation, below.

3.3.8. All joints in insulation overlay shall be offset 24" from joints of flat and tapered insulation, below.

3.4. INSULATION INSTALLATION (Base Bid and Alternate No.1)

3.4.1. Install roof system insulation material as follows:

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

3.4.1.2. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.

3.4.1.3. Loose lay one layer of gypsum thermal barrier directly to metal deck. (Except Roof Areas 6 and 24)

3.4.1.4. Create 4'x4' drain sumps using ½" per foot tapered insulation and wood fiber tapered edge strips.

3.4.1.5. Where slope is in the insulation, loose lay one layer of 1.5-inch base insulation. Loose lay a second layer of 1.5-inch base insulation to achieve required thickness. Where two or more insulation layers occur at sections of roofing, install layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

3.4.1.6. Where slope is in the metal deck, loose lay one layer of 1.5-inch base insulation. Loose lay a second layer of 1.5-inch base insulation. Loose lay a third layer of 1.5-inch base insulation to achieve required thickness Where two or more insulation layers occur at sections of roofing, install layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

3.4.1.7. Where slope is in the cementitious wood fiber deck, loose lay one layer of 1.5-inch base insulation. Loose lay a second layer of 1.5-inch base insulation to achieve required thickness. Where two or more insulation layers occur at sections of roofing, install layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

3.4.1.8. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding ¼-inch (6 mm) with insulation.

3.4.1.9. Cut and fit insulation within ¼-inch (6 mm) of nailers, projections, and penetrations.

3.4.2. Form crickets between drains and along the upslope side of all curb mounted equipment with base widths exceeding 18-inches using factory tapered polyisocyanurate insulation, fill units and tapered edge strips. Crickets, saddles and tapered edge strips must be installed before application of insulation overlayment.

3.4.2.1. Where slope is in the insulation, the half of the cricket between main roof drains opposing the main slope of the roof shall be formed with insulation boards tapered to a ¼-inch per foot slope, extending 4-feet out from the drain valley and continuing the tapered insulation system upslope to the ridge over the base insulation layer.

3.4.2.2. At all roofs, the half of the cricket between main roof drains opposing the backslope at the walls shall be formed with insulation boards tapered to a ½-inch per foot slope, extending 4-feet out from the drain valley where it meets the wall.

3.4.3. Loose lay one layer of 4’x8’x1/4” gypsum coverboard on top of flat and tapered insulation.

3.4.4. Mechanically Fastened Insulation:

3.4.4.1. Secure base, tapered insulation, and gypsum cover board to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type. Fasten each full insulation board in a pattern as described in FM Loss Prevention Data Sheet 1-29.

3.4.4.2. In the field, fasten each full insulation board with 10 fasteners per 4’ x 8’ board in a pattern as described in FM Loss Prevention Data Sheet 1-29. In no case less than 2 fasteners per single board segment.

3.4.4.3. Increase fastener spacing to 20 fasteners per 4’ x 8’ board in the 6’ perimeter and 32 fasteners per 4’ x 8’ board in the 6’ x 6’ corners.

3.4.4.4. Corner and perimeter enhancements are required to support the overall FM 1-90 rating and 90mph wind rider.

3.5. COVERBOARD INSTALLATION (Aternate No. 2)

3.5.1. Create 4’x4’ drain sumps using ½” per foot tapered insulation and wood fiber tapered edge strips.

3.5.2. Loose lay one layer of 4’x8’x1/2” gypsum coverboard on top of existing modified bitumen roof membrane.

3.5.3. Fasten each full board in a pattern as described in FM Loss Prevention Data Sheet 1-29.

3.5.3.1. In the field, fasten each full insulation board with 10 fasteners per 4’ x 8’ board in a pattern as described in FM Loss Prevention Data Sheet 1-29. In no case less than 2 fasteners per single board segment.

3.5.3.2. Increase fastener spacing to 20 fasteners per 4’ x 8’ board in the 6’ perimeter and 32 fasteners per 4’ x 8’ board in the 6’ x 6’ corners.

3.5.3.3. Corner and perimeter enhancements are required to support the overall FM 1-90 rating and 90mph wind rider

3.6. ROOF MEMBRANE INSTALLATION

3.6.1. Membrane Application: Apply roofing in accordance with roofing system manufacturer's current instructions and the following requirements. Application of roofing membrane components shall immediately follow application of insulation overlay, as a continuous operation.

3.6.2. Aesthetic Considerations: An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this project. Make necessary preparations, utilize recommended application techniques to apply the specified materials, and exercise care in ensuring that the finished application is acceptable to the Owner.

3.6.3. Priming: Prime metal, concrete, and masonry surfaces, and both sides of metal flashings, in contact with bituminous products, with a uniform coating of the specified asphalt primer.

3.6.4. Membrane Adhesive Application: Membrane adhesive can be applied by roller, squeegee or spray unit, as recommended by manufacturer of roofing system. Apply cold adhesive in a smooth, even, continuous layer without breaks or voids. Utilize an application rate of 1 1/2 to 2 gal/sq for interply applications. Utilize an application rate of 2 to 2 1/2 gal/sq over irregular or porous substrates.

3.6.5. Adhesive and Primer Consistency: Thinning or alterations of adhesives, primer, and sealants will not be permitted.

3.6.6. Roof Membrane Application: Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets. Broom base ply and top ply across their full width and along its full length.

3.6.6.1. Apply all layers of roofing perpendicular to the slope of the roof, starting installation at eaves and working upslope. Extend all layers of roof membrane across hips of tapered insulation system. Offset base ply and finish ply end laps at hips.

3.6.6.2. Apply all layers of the roof membrane without backwater or side-hill laps.

3.6.6.3. “Mop and flop” installation of roof membrane will not be permitted.

3.6.7. Base Ply Application (Hot Asphalt):

3.6.7.1. Adhere cant strips in hot asphalt or roof cement to surface of coverboard and to vertical face of parapets and curbs.

3.6.7.2. Fully bond the base ply to the surface of the mechanically attached coverboard. Install with minimum 3 inch side laps and 6” end laps. Apply each sheet directly behind the hot asphalt applicator.

3.6.7.2.1. Embed each ply sheet in a solid mopping of hot Type III asphalt with 25lbs/100 sq. ft.

3.6.7.3. Cut a dog ear angle at the end laps of the base ply, on overlapping selvage edges. Using a clean trowel, apply top pressure to seal T-laps immediately following sheet application. Stagger end laps a minimum of 3 feet.

3.6.7.4. Extend the base ply, dry, across the face of all cant strips, and cut off at top of cant strips.

3.6.7.5. Use a broom or weighted roller to apply light, even pressure to the top of the base ply membrane after it is rolled into the asphalt to promote proper adhesion.

3.6.8. Base Ply Application (Cold Adhesive):

3.6.8.1. Adhere cant strips to surface of coverboard and to vertical face of parapets and curbs.

3.6.8.2. Membrane adhesive can be applied by roller, squeegee or spray unit, as recommended by manufacturer of roofing system. Apply cold adhesive in a smooth, even, continuous layer without breaks or voids. Utilize an application rate of 1 1/2 to 2 gal/sq for interply applications. Utilize an application rate of 2 to 2 1/2 gal/sq over irregular or porous substrates.

3.6.8.3. Fully bond the base ply to the surface of the mechanically attached coverboard. Install with minimum 3 inch side laps and 6” end laps. Apply each sheet directly behind the cold adhesive applicator.

3.6.8.4. Cut a dog ear angle at the end laps of the base ply, on overlapping selvage edges. Using a clean trowel, apply top pressure to seal T-laps immediately following sheet application. Stagger end laps a minimum of 3 feet.

3.6.8.5. Extend the base ply, dry, across the face of all cant strips, and cut off at top of cant strips.

3.6.8.6. Use a broom or weighted roller to apply light, even pressure to the top of the base ply membrane after it is rolled into the cold adhesive to promote proper adhesion.

3.6.9. Finish Ply Application:

3.6.9.1. Before installation of the finish ply begins, install an additional, fully adhered layer of base ply, as reinforcing sheet, across the cant strip, using specified flashing cement, extending 3” above the cant strip and 3” onto the horizontal surface of the previously installed base ply, in accordance with system manufacturer’s instructions.

3.6.9.2. At wood substrates, extend the backer ply, dry, above the cant strip, to the height of the finished base flashing and fasten to the substrate at 6” centers, in both directions, using specified, capped nails.

3.6.9.3. Before installation of finish ply begins, install all flanged flashings over base ply as outlined in Paragraph 3.5 Roof System Interface with Related Components, below.

3.6.9.4. Fully bond the finish ply to the base ply, utilizing minimum 3 inch side and 6” end laps. Apply each sheet directly behind the cold adhesive applicator. Stagger end laps of the finish ply a minimum 3 feet.

3.6.9.5. Cut a dog ear angle, at the end laps of the finish ply, on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application.

3.6.9.6. Offset side laps of the finish ply 18 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum 3 feet from end laps in the underlying base ply and from the adjacent sheets of finish ply.

3.6.9.7. Use a broom or weighted roller to apply light, even pressure to the top of the finish ply membrane after it is rolled into the cold adhesive to promote proper adhesion.

3.6.10. Adhesive and Cement Overruns: Cover all adhesive and flashing cement overruns on the base flashing or finish ply surface with specified reflective coating while the adhesive or cement is still soft to ensure a monolithic surface color.

3.6.11. Base Flashing Application: Flash walls and curbs using the reinforcing sheet and the aluminum clad flashing sheet, applied in specified flashing cement.

3.6.11.1. Except as noted above for wood substrates, fully adhere the reinforcing sheet to the base ply and other substrates using specified flashing cement, prior to installation of the finish ply. Incorporate minimum 3 inch side laps; extending the sheets a minimum of 3 inches onto the base ply surface and 3 inches up the wall or curb, above the cant, unless otherwise required by roof system manufacturer.

3.6.11.2. Terminate the finish ply at the top of the cant. Cut the specified surface flashing sheet across the width of each roll, maintaining the selvage edge along one side of the cut flashing sheet.

3.6.11.3. Apply a uniform coat of the specified flashing cement to the area to receive flashing coverage and to the backside of the precut section of base flashing. Set the flashing in place while exerting pressure on the flashing sheet to ensure complete contact with the wall/roof surfaces and to prevent air pockets. Check and seal all loose laps and edges.

3.6.11.4. Fasten the top edge of the flashing sheet to wood blocking or to wood substrates using 1-1/4”, stainless steel, capped, ring shank nails spaced at 4” centers.

3.6.11.5. Secure top edge of the flashing sheet to masonry blocking with a termination bar fastened with drive pins at 6” O.C. through pre-punched holes.

3.6.12. Catalyzed Acrylic Resin Flashing System: Install the liquid-applied primer and flashing system in accordance with the system manufacturer’s printed installer’s guidelines for an interply application. Observe all other applicable written recommendations as provided by the manufacturer.

3.6.12.1. Remove all bitumen, debris, rust, scale and other foreign matter from surfaces receiving catalyzed flashing system, prior to installation. Use scrapers, wire brush and/or grinders, as necessary.

3.6.12.2. Treat cleaned areas receiving ParaPro Flashing with Siplast Pro-Prep and allow to dry.

3.6.12.3. Apply Siplast ParaPro ProFleece to prepared surface of roof and penetrations thru roof in strict accordance with manufacturer’s written

instructions, including pre-saturation of ProFleece laps with the Catalyzed Acrylic Resin.

3.6.12.4. Apply base coat and top coat of catylzed resin to ParaPro fleece. Allow manufacturer's instructions regarding drying and curing time between coats.

3.6.13. Water Cut-Offs: At end of each day's work, or when precipitation is imminent, construct water cut-offs at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, and shall be constructed so as to withstand protracted periods of service. Cut-offs must be completely removed prior to the resumption of roofing.

3.6.14. Walk pads: Install specified walk pads over finish ply, at designated locations, using specified flashing adhesive.

3.7. ROOF SYSTEM INTERFACE WITH RELATED COMPONENTS

3.7.1. Lead Drain Flashings: Completely prime both sides of the 30" x 30" sheet lead drain flashing and allow to dry prior to installation. After the base ply has been applied, set the lead flashing sheet in a full bed of roof cement and form the lead sheet to turn down 1-1/2" inside of the drain bowl. Strip-in the lead flashing using a layer of the base ply or base sheet material, overlapping the outside perimeter of the lead a minimum of 6 inches. Terminate the finish ply so as to extend beneath the clamping ring. Install the clamping ring with all bolts set in place and tightened.

3.7.2. Walk Pad: Adhere the walk pad to the finish ply using the specified plastic cement. Apply the specified cement in a 3/8 inch thickness to the back of the product in 5 inch by 5 inch spots in accordance with the pattern as supplied by the walk pad manufacturer. Walk-in each sheet after application to ensure proper adhesion. Use a minimum spacing of 2 inches between sheets to allow for proper drainage.

3.7.3. Sealant: Apply a smooth continuous bead of the specified sealant at the exposed edges of the finish ply at the transition to all metal flashings incorporated into the roof system.

3.7.4. Gas Piping: Support gas piping at 9' O.C. with specified gas pipe stands. Set gas pipe stand in a bed of utility cement on a sacrificial cap sheet membrane, which extends a minimum of 4" beyond the gas pipe support base in all directions. Sacrificial cap sheet membrane shall be spot adhered to the cap sheet surfacing.

3.7.5. Condensate Drain Piping: Support PVC piping at 5' O.C. with specified condensate pipe stands. Set pipe stand in a bed of utility cement on a sacrificial cap sheet membrane, which extends a minimum of 4" beyond the pipe support base in all directions. Sacrificial cap sheet membrane shall be spot adhered to the cap sheet surfacing.

3.7.6. Miscellaneous Flanged Flashings

3.7.6.1. Coat both top and bottom surfaces of miscellaneous flanged flashing with asphalt primer and allow to dry. When dry, set primed flange over field membrane plies in solid bed of black plastic roof cement.

3.7.6.2. If flange width exceeds 12 inches, secure it to previously installed wood blocking with suitable fasteners placed near each corner and at the center of each side.

3.7.6.3. Seal flange with one base ply to field membrane ply. Fit stripping ply snugly to vertical flanges. Extend stripping ply at least six inches beyond the flange.

3.7.6.4. Extend flashing sleeves a minimum height of 8” above the roof surface.

3.8. FIELD QUALITY CONTROL AND INSPECTIONS

3.8.1. Site Condition: Leave all areas around job site free of debris, roofing materials, equipment and related items after completion of job.

3.8.2. Schedule required manufacturer’s progress inspections at specified intervals. Notify Project Roof Consultant of scheduled inspection dates. Provide Project Roof Consultant with copies of manufacturer’s inspection reports in a timely fashion. Provide pertinent information regarding proposed and completed repairs required by the manufacturer.

3.8.3. Notification of Completion: Notify the manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.

3.8.4. Final Inspection

3.8.4.1. Notify Roof Consultant of scheduled time and date of manufacturer’s final inspection.

3.8.4.2. Post-Installation Meeting: Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters and to the Roof Consultant.

3.8.5. Issuance of The Guarantee: Complete all post installation procedures and meet the manufacturer's final endorsement for issuance of the specified guarantee.

END OF SECTION 07550

SECTION 07591

REROOFING REMOVALS & PREPARATION

PART 1 GENERAL

1.1 SUMMARY

1.1.1 This Section includes the following:

1.1.1.1 Existing Roof System Assembly Removals (Reroofing)

1.1.1.2 Existing Roof System Assembly Removals (Recover)

1.1.1.3 Preparing the Existing Substrate Decking for New Roof Construction

1.1.1.4 Installation of New Wood Blocking at Parapet Walls

1.1.1.5 Installation of New Wood Blocking at Expansion Joints

1.1.1.6 Existing Abandoned Equipment Curb Removals

1.1.1.7 Existing Roofing System Assemblies Disposal

1.2 RELATED WORK SPECIFIED ELSEWHERE

1.2.1 Allowances: Refer to Division 1 Section 01021 "Cash Allowances" for description of Work in this Section affected by allowances.

1.2.2 Unit Prices: Refer to Division 1 Section 01025 “Measurement and Payment” for description of Work in this Section affected by unit prices.

1.2.3 Wood Blocking: Refer to Division 6 Section 06100 “Rough Carpentry” for description of Work in this Section affected by wood blocking installation.

1.3 SUBMITTALS

1.3.1 Product Data: Reference Section 01300 “Submittals.”

1.3.2 Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.

1.4 QUALITY ASSURANCE

1.4.1 Installer Qualifications: Reference Section 01400 “Quality Control.”

1.4.2 Pre-roofing Conference: Prior to the work beginning, conduct a pre-construction conference with the Owner and Roof Consultant at St. James Middle School with the Contractor’s project foreman and project manager in attendance.

1.5 PROJECT CONDITIONS

1.5.1 Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.

1.5.2 Coordinate work activities daily with Owner so Contractor can place protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or detection equipment if needed, and evacuate occupants from below the work area if desired.

1.5.3 Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below the affected area. Verify that occupants below the work area have been evacuated prior to proceeding with work over the impaired deck area.

1.5.4 Protect building to be reroofed, building interiors, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations. Repair affected areas to original existing condition previous to reroofing project.

1.5.5 Protect occupants and property below roofing activity at all times until work overhead is complete to the point that protection is no longer required.

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

1.5.6.1 Do not close or obstruct walkways, corridors and other occupied or used facilities without written permission from authorities having jurisdiction.

1.5.7 Limit construction loads on roof to 20 lbs/SF for uniformly distributed loads which includes rooftop equipment wheel loads.

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

PART 2 PRODUCTS

2.1 AUXILIARY REROOFING MATERIALS

2.1.1 General: Auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of new roofing systems.

2.1.2 Wood blocking to wood substrate: Stormguard® hot dipped galvanized ring shanked or spiral decking nails with minimum 3/8” head as manufactured by Maze Nails.

2.1.3 Wood to Wood Screws: Shall be ITW Buildex DEC-KING™ Climacoat™ bugle head, size for length required 6x1- 1/4" (part No. 2176500) for sheathing to sheathing application.

2.1.4 Wood blocking to structural steel: Corrosion resistant, self tapping, self-drilling screw with low profile head such as TRAXX™ 4.5 by ITW Buildex where length will allow; and where greater length is required countersink head and utilize TRAXX™ 5 by ITW Buildex. Acceptable equal alternates as manufactured by Construction Fasteners, Rawl, Olympic and Tru-Fast must be submitted for approval.

2.1.5 Wood to Metal Screws: Shall be ITW Buildex TRAXX™ Climacoat™ flat head 12-24X2 ½" (part No. 1094000).

2.1.6 Wood blocking to masonry wall: hot dipped, galvanized 3/8" diameter threaded rod embedded a minimum of 4" into the masonry and set in fast curing epoxy.

2.1.7 Fast Curing Epoxy: ASTM C881-90, Type IV, Grade 3, Class A, B and C, two-part, fast curing epoxy such as C6 Fast Curing Epoxy, as manufactured by Epcon.

2.1.8 One-Piece, Vibration Resistant Masonry Anchor: Shall be Powers SPIKE® ¼ inch diameter manufactured from high grade carbon steel (ASTM B 633) with mushroom head at one end and a specially designed "S" shaped expansion mechanism on the working end. Perma-Seal Fluoropolymer Coating. Pre-drill hole 1/2-inch depth greater than SPIKE length. Johns Manville CD-10 Fastener w/ CR-10 coating approved equal.

2.1.9 Metal Primer: High performance, corrosion resistant and fast drying metal primer such as Interior/Exterior Flat Rusty Metal Primer Paint and Primer in One, as manufactured by Rust-Oleum.

2.1 DECKING FOR INFILL AT ABANDONED CURBS

2.1.1 1/8" thick steel plate.

2.1.2 ¼"x2"x2" and ¼"x3"x3" miscellaneous steel angle.

2.1.3 22 gage steel metal "B" deck: 1 ½'" deep, intermediate rib, structural roof deck unit that provides a support surface for various types of roofing materials.

2.1.3.1 Profile to match existing metal deck.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

3.1.1 Protect existing roofing systems that are indicated not to be reroofed.

3.1.2 Coordinate with Owner to shut down air intake equipment in the vicinity of the Work. Cover air intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.

3.1.2.1 Contractor is responsible for disconnection of existing roof mounted equipment and electrical wiring, as well as all reconnections and testing.

3.1.3 Check all internal roof drains for clear passage of storm water. Report any clogged drains to OWNER prior to the start of reroofing work. Contractor's start of work is regarded as Contractor's acceptance of clear drainage. Contractor will be responsible for all work required to clear drainage path after work under this contract has begun.

3.1.3.1 Replace any plastic, damaged or missing drain strainer baskets with new cast iron strainer baskets.

3.1.3.2 Replace any damaged or broken drain clamping rings or bolt fasteners.

3.1.4 Raise mechanical equipment and curbs as necessary to maintain minimum 8" base flashing height.

3.1.4.1 Extend sanitary vents as necessary to a minimum height of 8" above the finished roof surface.

3.1.5 Maintain roof drainage path in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drainage path and conductors. For internal drainage systems, use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

3.1.6 It is not anticipated that hazardous materials will be encountered in the work of this project. There are no existing products containing asbestos fibers. Reference Section 01010 Summary of Work.

3.1.6.1 If encountered materials are suspected of containing hazardous materials, do not disturb; immediately notify Roof Consultant and Owner. Hazardous materials not currently identified in the contract documents will be removed by Owner as a Change Order to the Contract or under separate contract with separate specialty contractor.

3.1.7 Storage or sale of removed items or materials on–site will not be permitted.

3.1.8 Utility Service: Maintain existing utilities in service and protect them against damage during the selective demolition operations.

3.1.8.1 Maintain security and fire protection facilities in service during selective demolition operations.

3.1.8.2 When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered,

investigate and measure the nature and extent of the conflict. Promptly submit in writing a report to the Roof Consultant.

3.1.8.3 Verify that rooftop utilities and service piping have been shut off before commencing work which may not be safe if service is left on.

3.1.8.4 Coordinate shutdown or disconnect of rooftop utilities or service piping with Owner, no less than 72 hours before shutdown or disconnect are scheduled.

3.1.9 Site Access and Temporary Controls: Conduct removals, preparations, and roofing installation operations to ensure minimum interference with roads, streets, walks, walkways and other adjacent occupied and used facilities.

3.1.9.1 Do not close or obstruct roads, streets, walks, walkways and other adjacent occupied and used facilities without written permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

3.1.9.2 Erect temporary protection where required by authorities having jurisdiction.

3.1.10 Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

3.1.10.1 Provide Temporary toilet facilities on site in location to be determined by Owner and Roof Consultant.

3.1.10.2 Provide chain link fencing for kettle with temporary standards. Do not penetrate existing pavement to support fencing or temporary barricades.

3.1.11 Examination of Roof Drains

3.1.11.1 Remove all asphalt or misc. sealant accumulations from interior of all drain and overflow drain bowls prior to start of roof removals. Perform a water test for all prepared drain bowls and overflow drain bowls to locate any existing defects in drain casting.

3.1.11.2 Verify integrity of anchor lugs or threaded attachment points for drain clamping rings.

3.1.11.3 Advise Roof Consultant of any defect found in drain assemblies prior to start of roof removal. Contractor is responsible for all drains once new roof assembly is applied.

3.2 EXISTING ROOF SYSTEM ASSEMBLY REMOVALS (REROOFING):

3.2.1 General: Notify Owner each day of extent of removals or roof tear-off proposed and obtain authorization to proceed from Owner's point of contact.

3.2.2 Remove and discard existing aggregate surfaced roof membrane, insulation, and gypsum thermal barrier down to the metal or cementitious wood fiber roof deck.

3.2.3 Remove and discard existing metal parapet coping.

3.2.4 Remove and discard existing metal expansion joint flashings.

3.2.5 Remove and discard abandoned pipe penetrations as identified in project drawings.

3.2.6 Remove or repair any unused obstruction which may interfere with the proper application of new materials.

3.3 EXISTING ROOF SYSTEM ASSEMBLY REMOVALS (RECOVER):

3.3.1 Cut out and remove all sumps in the existing roofing assembly at each main drain location.

3.3.2 Cut out and remove all existing base flashings.

3.3.3 Remove and discard existing metal parapet coping.

3.3.4 Remove and discard existing metal expansion joint flashings.

3.3.5 Remove and discard abandoned pipe penetrations as identified in project drawings.

3.3.6 Remove or repair any unused obstruction which may interfere with the proper application of new materials.

3.4 PREPARING THE EXISTING SUBSTRATE DECKING FOR NEW ROOF CONSTRUCTION:

3.4.1 Inspect roof deck, daily, during and after tear-off of BUR roofing system. Provide fall-thru protection over known or suspected areas of deteriorated roof deck

3.4.2 Verify that attachment of the existing wood blocking meets the requirements of Table 2304.10.1, "Fastening Schedule," in the International Building Code. Install additional fasteners as necessary.

3.4.3 Remove any existing deteriorated roof deck and replace with new decking to match existing profile and thickness. Maintain and submit daily log of deck replacement work.

3.4.4 Do not proceed with installation of new roof decking until the Roof Consultant or Owner are notified and direction is given to proceed with the work.

3.4.5 Extend wood blocking at equipment curbs, parapet walls and expansion joints as necessary to maintain minimum 8” base flashing heights. Expand wood blocking at equipment curbs as necessary to maintain a ½” overlap of equipment base vertical face.

3.4.6 Application of new materials constitutes approval by the installing roofing contractor that the substrate conditions are satisfactory.

3.4.7 Metal Deck (where exposed):

3.4.7.1 Replace missing, broken, or loose side lap fasteners that secure deck panels to one another, using specified fasteners. Maximum spacing of side lap fasteners shall be 20” OC.

3.4.7.2 At roof deck perimeter 8’ edge, decrease fastener spacing of the existing roof deck to structural supports by installing additional specified, self-drilling fasteners spaced such that the maximum distance between fasteners is 6”.

3.4.7.3 Use a rotary wire brush to remove scale and rust from steel roof deck. Coat prepared areas with one coat of Rust-Oleum Rusty Metal Primer. Maintain and submit daily log of unit price work. See Section 01010 of these specifications for Unit Price Quantities to include in Base Bid for removal of rust and scale and for treatment of rusted deck.

3.4.7.4 Remove any existing deteriorated steel roof deck and replace with new steel roof deck of like gauge and profile. Maintain and submit daily log of unit price work. See Section 01010 of these specifications for Unit Price Quantities to include in Base Bid for metal deck replacement.

3.4.7.5 Do not proceed with installation of new roof decking until Roof Consultant or Owner are notified and direction is given to proceed with the work.

3.4.8 Cementitious Wood Fiber Deck:

3.4.8.1 If cement fiber decking is damaged or deteriorated, repair or replace in accordance with Section 03500 "Cementitious Wood Fiber Plank".

3.4.8.2 Extend wood blocking at equipment curbs and expansion joints as necessary to maintain minimum 8” base flashing heights.

3.4.8.3 If deck surface is not suitable for receiving new roofing, or if structural integrity of deck is suspect, immediately notify Roof Consultant. Do not proceed with installation until directed by Roof Consultant.

3.4.9 Mineral Surfaced Built-Up Roof Membrane (Alternate No. 2):

3.4.9.1 Where existing wet insulation was removed, install new insulation to match the thickness of the existing adjacent insulation to remain.

3.4.9.1.1 Insulation boards shall be cut neatly to fit tight against vertical surfaces.

3.4.9.1.2 Secure new insulation to the roof deck using a minimum of 1 fastener per 2 square feet in the field and perimeter; and 1 fastener per 1 square foot in the corners.

3.4.9.1.3 Partial insulation units less than 2 square feet in area must be fastened with a minimum of two fasteners.

3.4.9.2 Where existing assembly was removed for the drain sumps install new ½" tapered insulation boards to form a 4' x 4' sump finishing flush with the new roofing assembly.

3.4.9.3 Cut out and remove existing blisters in the cap sheet membrane.

3.4.9.4 Make new patches watertight where blisters were removed or insulation was replaced using Base ply and cold adhesive to tie into the existing roof membrane. New membrane shall lap a minimum of 6" onto the existing roof membrane.

3.4.9.5 Any areas where the existing roof membrane has significantly craze cracks (gaps 1/16" or greater in width and/or depth) must be repaired using bulking material to bring the substrate to a smooth, workable surface.

3.4.9.5.1 Allow at least 24 hrs. to dry. Areas with thicker applications may require additional drying time.

3.4.10 Confirm that all items to be removed, have been, and that appropriate substrate has been installed and appropriately attached to structure for support of the new roofing system.

3.4.11 CORRECT ALL UNSATISFACTORY SUBSTRATE CONDITIONS PRIOR TO THE APPLICATION OF NEW ROOF SYSTEM MATERIALS. RENAIL EXISTING AND ADD NEW NAILS TO ROOF SHEATHING TO ASSURE SOLID, SECURE DECK.

3.5 INSTALLATION OF NEW WOOD BLOCKING AT PARAPET WALLS:

3.5.1 Remove and discard existing coping cap and metal flashings.

3.5.2 Install new 2x wood blocking on top of the existing masonry or wood blocking, flush with the inside and outside face of the coping, as shown on the Project Drawings.

3.5.3 Secure new wood blocking to existing wood blocking or masonry with masonry anchors spaced at 16" O.C.

3.5.4 Install new wood fiber tapered edge strip over the new and existing wood blocking.

3.5.5 Install new locking cleat for the coping cap as described in Spec Section 07620 “Flashing and Sheetmetal.”

3.5.6 Cover top of the new wood fiber edge strip with 20 mil PVC, extending over the locking cleat on the inside and outside face of the parapet wall.

3.6 INSTALLATION OF NEW WOOD BLOCKING AT EXPANSION JOINTS:

3.6.1 Prior to fastening the new wood blocking to the existing wood blocking, verify that the existing blocking is securely attached to the structure. If necessary, secure existing blocking with additional fasteners as necessary to decrease fastener spacing to 16” O.C.

3.6.2 At roof-to-wall expansion joints, install new 2 x 6 wood blocking on top of the existing wood blocking at the expansion joint, as shown on Project Drawings.

3.6.2.1 New wood blocking should finish approximately 10” minimum above the new roof assembly.

3.6.2.2 Fasten new wood blocking to top of existing wood blocking with two screws at 16” O.C.

3.6.2.3 Cut a slight taper to the top pieces of wood blocking, providing slope toward the new roofing assembly.

3.6.2.4 The exterior, top, and interior face of the expansion joint are to be covered with 45 mil peel-and-stick SAWU membrane on the same day blocking is installed.

3.6.2.5 Create an envelope fold between the wood blocking on either side of the joint, using 20 mil PVC flashing filled with un-faced fiberglass batt insulation.

3.7 EXISTING ABANDONED EQUIPMENT CURB REMOVALS:

3.7.1 Remove and discard abandoned equipment curbs and caps.

3.7.2 Where openings in the existing roof deck are less than 18”, install a 1/8” steel plate over the opening, extending a minimum of 6” beyond the opening in all directions.

3.7.2.1 Fasten steel plate to the roof deck with a minimum of 3 fasteners per side.

3.7.3 Where openings in the roof deck are larger than 18” but less than 36”, install new 3” x 3” x 5/16” miscellaneous steel angle to existing steel angle framing the opening with (2) ITW Buildex, Traxx fasteners on each end. The top flange of angle shall be flush with the bottom of the roof deck.

3.7.4 Where openings in the roof deck are larger than 36” x 36”, install miscellaneous steel angle perpendicular to existing angles or bar joists at opening ends and 30”

O.C. maximum intermediate spacing. Secure to top chord of existing bar joist angle with (2) ITW Buildex, Traxx fasteners on each end.

3.7.5 Where the opening in the roof deck does not fall on a bar joist, install new 3" x 3" x 1/4" miscellaneous steel angles perpendicular to perimeter steel angles and secure to steel angle with 1.5"x2" miscellaneous angle clips fastened with (2) ¼" ITW Buildex, Traxx fasteners through steel angle and to each other through the angle flange with (2) ¼" bolts.

3.7.6 Install new 22-gauge galvanized steel "B" deck to miscellaneous steel angles and attach with hex-headed, self tapping fasteners at 6" OC Retain below if a temporary roof is permitted and removal is required.

3.8 EXISTING ROOFING SYSTEM ASSEMBLIES DISPOSAL:

3.8.1 Collect and place demolished materials in containers daily. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

3.8.2 For Asbestos Containing Material (ACM) use protocol as required by all regulatory agencies having jurisdiction. Utilize disposal site as selected by the Owner.

3.8.3 Do not burn demolished material on site.

3.8.4 Transport demolished materials off Owner's property and dispose of legally.

END OF SECTION 07591

SECTION 07620

FLASHING AND SHEET METAL

PART 1 GENERAL

1.1 WORK INCLUDED

1.1.1 Fabrication and installation of coping cap and locking cleats.

1.1.2 Fabrication and installation of new metal edge trim.

1.1.3 Fabrication and installation of new metal gutter and downspouts.

1.1.4 Fabrication and installation of new metal through parapet overflow scupper liners.

1.1.5 Fabrication and installation of new expansion joint cover.

1.1.6 Fabrication and installation of new pipe housing.

1.1.7 Fabrication and installation of new counter flashings and receivers.

1.1.8 Fabrication and installation of new miscellaneous flanged flashings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

1.2.1 Rough Carpentry - Section 06100

1.2.2 Modified Bitumen Membrane Roofing – Section 07550

1.2.3 Reroofing Removals & Preparations – Section 07591

1.3 QUALITY ASSURANCE

1.3.1 Qualifications of the Manufacturer: Products used in the work of this section shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful production acceptable to the Architect.

1.3.2 Qualifications of the Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and are completely familiar with the specified requirements and the methods needed for the proper performance of the work in this section.

1.4 SHOP DRAWINGS

1.4.1 Submit shop drawings for all metal component shapes in accordance with specifications.

1.4.2 Indicate material profile, jointing pattern, jointing details, fastening methods, and installation details.

1.5 SUBMITTALS

1.5.1 Refer to Shop drawings, Product Data and Samples - Section 01340

1.6 STORAGE AND HANDLING

1.6.1 Store materials dry in accordance with Specifications.

1.6.2 Stack material to prevent twisting, bending, or abrasion.

1.6.3 During storage prevent material contact with any substance that would discolor or stain, including soil and water.

1.7 SCHEDULING

1.7.1 All new sheet metal work shall be closely coordinated with the installation of the new roofing membrane such that roofing membrane terminations will not be left unprotected by metal.

1.7.2 New sheet metal components shall be installed directly after roofing work such that roofing membrane terminations will not be left unprotected by metal.

1.7.3 Immediately after installation of new sheet metal work install all bituminous flashings such that moisture is not trapped under new metal components.

1.8 GUARANTEE

1.8.1 All new materials and workmanship for work provided under this section of the specifications shall be guaranteed in writing by the contractor to be maintained in a watertight condition without cost to the Owner for a period of two (2) years after date of final completion.

PART 2 PRODUCTS

2.1 SHEET METAL MATERIAL

2.1.1 Pre-finished Metal: Smooth 0.040 aluminum, ASTM B204, primed both sides and factory finished on one side with Kynar based fluoropolymer coating. Metal to be masked with protective plastic film. Color to be selected by Owner from the manufacturer’s premium color chart. Accepted manufacturers are Vincent Metals and Petersen Aluminum.

2.1.2 Aluminum, Sheet: Conforming to ASTM B09. Note: Divorce from any preservative treated lumber with at a minimum one layer of 15 Lb. asphalt saturated felt.

2.1.3 Mill Finish Aluminum Sheet: Aluminum sheets conforming to ASTM B209. Note: Divorce from any preservative treated lumber with at a minimum one layer of 15 Lb. asphalt saturated felt.

2.1.4 Termination Bar: Shall be Aluminum Alloy 6061-T6, 1/8-inch x 1 1/4 inch.

2.1.5 Stainless steel: 24 gage, Type 302/304 Mill Rolled Finish No.2D or 2B, Conforming to ASTM A167, Federal Specification QQ-S-766C.

2.1.6 Solder for Stainless Steel: Solder joints with stainless steel type flux, 50/50 solder, neutralize flux after soldering.

2.1.7 METAL COMPONENT WEIGHT & FINISH SUMMARY:

2.1.7.1	coping cap	.040 pre-finished aluminum
2.1.7.2	locking cleats	.050 mill finished aluminum
2.1.7.3	metal fascia trim	.040 pre-finished aluminum
2.1.7.4	metal edge trim	.040 pre-finished aluminum
2.1.7.5	downspout	.040 pre-finished aluminum
2.1.7.6	downspout strap assembly	1/8” x 1” aluminum flat bar
2.1.7.7	gutter	.040 pre-finished aluminum
2.1.7.8	gutter bracket	3/16” x 1” aluminum flat bar
2.1.7.9	gutter spacer	1/8” x 1” aluminum flat bar
2.1.7.10	counter flashing, curb	.040 mill finished aluminum
2.1.7.11	counter flashing, wall	.040 pre-finished aluminum
2.1.7.12	expansion joint cap and flange	.040 pre-finished aluminum
2.1.7.13	overflow scupper liner	24 ga. stainless steel
2.1.7.14	pipe housing	24 ga. stainless steel

2.2 ACCESSORY MATERIALS

2.2.1 All miscellaneous clamps, straps and supports, not otherwise designated above, to be stainless steel.

2.2.2 Nails: Shall be hot-dipped galvanized or stainless-steel ring shank nails, size as required by construction. Use only stainless-steel nails with aluminum fabrications.

2.2.3 Metal to Metal Screws: Shall be ITW Buildex SCOTS stainless steel 12-14x1” (Part No. 1165209) with bonded washer.

2.2.4 Wood to Metal Screws: Shall be ITW Buildex TRAXX™ Climacoat™ flat head 12-24X2 ½” (part No. 1094000).

2.2.5 Wood to Masonry Fasteners: Shall be be ITW Buildex TAPCON™ Blue

Climaseal™ flat head 1/4x2-3/4" (part No. PFH 3189407) with drill bit (part No. 3099910).

2.2.6 Wood to Wood Screws: Shall be ITW Buildex DEC-KING™ Climacoat™ bugle head, size for length required 6x1- 1/4" (part No. 2176500) for sheathing to sheathing application.

2.2.7 Caulking: Sealant shall be Sikaflex - 1a, manufactured by Sika Corporation; Chem-Calk 900, manufactured by Bostik, Inc.; or Sonolastic NP-1, manufactured by Sonneborn Building Products or approval equal. Color shall be selected by Owner.

2.2.8 Cleaner: For Sikaflex 1a, cleaner shall be Xylol, Toluol, Methly ethyl ketone or commercial solvent recommended by the sealant manufacturer.

2.2.9 Primer: Shall be as recommended by sealant manufacturer.

2.2.10 Flexible Vinyl Flashing: Shall be 20 mil PVC, width as required, such as that manufactured by BMCA, a division of GAF.

2.2.11 Masonry Expansion Fasteners: Shall be Powers Zamac Nailin drive anchor with Type 304 stainless steel nail ¼" x 2" (Catalog No. 2876).

2.2.12 One-Piece, Vibration Resistant Masonry Anchor: Shall be Powers SPIKE® ¼ inch diameter manufactured from high grade carbon steel (ASTM B 633) with mushroom head at one end and a specially designed "S" shaped expansion mechanism on the working end. Perma-Seal Fluoropolymer Coating. Pre-drill hole 1/2-inch depth greater than SPIKE length. Johns Manville CD-10 Fastener w/ CR-10 coating approved equal.

PART 3 EXECUTION

3.1 INSPECTION

3.1.1 Inspect all surfaces to which metal is to be applied to verify they are clean, smooth, and free of depressions, waves, or projections and have solidly supported joints. Do not install metal unless surfaces are even, sound, clean, dry, and free from defects that might affect the application of the new material.

3.2 REMOVALS

3.2.1 See Reroofing Removals & Preparations – Section 07591

3.3 FABRICATION, GENERAL

3.3.1 Fabricate and install sheet metal sections in 10-foot lengths except where shorter lengths are required by construction.

3.3.2 Form sections square, true, and accurate to size, free from distortion, sharp edges, and other defects detrimental to appearance or performance.

3.3.3 Junctures, intersections, corners, and unions of sheet metal fabrications shall be

formed with 18-inch legs.

3.3.4 Interior and exterior corners and joints of coping cap shall be formed with 1-inch standing seams.

3.3.5 All Sheet Metal Requirements and Details are referenced to SMACNA Architectural Sheet Metal Manual, Seventh Edition.

3.4 INSTALLATION

3.4.1 Dissimilar metals shall be kept separated to prevent galvanic action. Preventative measures shall include separation by suitable electrolosis breaking material.

3.4.2 Separate any aluminum components from preservative treated lumber with a minimum divorcing layer of 15 lb. asphalt saturated building felt. NEVER USE ALUMINUM FASTENERS IN PRESERVATIVE TREATED LUMBER.

3.4.3 All metal flanges shall be installed on top of membrane in accordance with membrane manufacturer's written installation instructions.

3.4.4 Flash in metal flanges per roofing system manufacturer's written recommendations unless in conflict with contract documents and/or detail drawings. Resolve any conflict with Roof Consultant, prior to installation of stripping plys.

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

3.4.6 Form and install new counterflashing metal as shown in detail drawings. Lap joints 3 inches.

3.4.7 All exposed edges of sheet metal shall be folded back, or hemmed, on concealed surfaces (minimum ½").

3.4.8 All hemmed edges to be engaged in locking cleats shall have 3/4" hem with a folded back return of 5/8". Hem angle maximum 30°. Reference SMACNA Architectural Sheet Metal Manual (Seventh Edition) Figure 2-1 Detail 1.

3.4.9 Install shop formed gravel stops, fascias, coping caps, control joints and expansion joint covers in 10-foot lengths, maximum, with a minimum number of pieces for each straight run. Adjust joint spacing so that no metal fabrication less than 5' in length is required.

3.4.10 All locking cleats to be one gauge heavier than metal fabrication being secured by the cleat.

3.5 FABRICATION AND INSTALLATION OF COPING CAP AND LOCKING CLEATS:

3.5.1 Form and install new metal coping cap in accordance with SMACNA Architectural Sheet Metal Manual Figure 3-4 A.

3.5.2 Attach new continuous metal locking cleat to the inside and outside face of the

parapet wall with fasteners spaced 6” O.C.

3.5.3 Prior to the application of the metal coping cap, install a strip of 20 mil PVC flashing in as long a strip as practical over the wood blocking and metal locking cleats. Lap ends 6” minimum and cement with flashing cement.

3.5.4 Use maximum 10’ sections with minimum number of sections in each straight run. Form 1” standing seam at ends of sections and seal.

3.5.5 Engage the coping cap with locking cleats on the interior and exterior face of the parapet wall.

3.5.6 Continuously crimp the hem of the coping cap to the locking cleat on the exterior and interior sides of the parapet wall.

3.6 FABRICATION AND INSTALLATION OF NEW METAL EDGE TRIM:

3.6.1 Form metal edge trim in accordance with project drawings and SMACNA Architectural Sheet Metal Manual (Seventh Edition) Figure 2-1B and Figure 2-1 Detail 1 and the Basic Flange Nailing Pattern.

3.6.2 After installation of the new metal gutter, set metal edge fascia over base ply, adhered in bonding cement over wood blocking and sheathing, as indicated on the drawings for roof edge conditions.

3.6.3 Metal flange shall be fastened through base ply with fasteners spaced at 3-inches O.C. staggered. Lap end laps a minimum of 3”.

3.6.4 Strip flange in with one stripping ply and cover with the cap sheet membrane, both applied in manufacturer’s recommended flashing adhesive.

3.6.5 Prior to the installation of any fascia that is in direct contact with preservative treated wood, install a divorcing sheet of 15-lb asphalt impregnated building paper.

3.7 FABRICATION AND INSTALLATION OF NEW METAL GUTTER AND DOWNSPOUTS:

3.7.1 Prior to the installation of new metal gutters, attach new continuous metal fascia trim (profile like Detail 1 of Figure 2-1) to existing and new wood blocking with concealed pancake head fastener spaced 6” O.C. in a row approximately 1” down from the fascia top edge.

3.7.2 Install new gutters at eave of RAs 16 & 24 as specified herein, reference Roof Plans for gutter locations. Refer to SMACNA Architectural Sheet Metal Manual (Seventh Edition) Figure 1-2; Style A.

3.7.3 Form from 0.040-inch- thick, pre-finished metal sheet. Match profile indicated on drawings, complete with end pieces, outlet tubes, and other special pieces as required.

3.7.3.1 Size of gutter to be 6 inches wide by 5 inches deep. Fabricate in minimum 120-inch- long sections, sized according to SMACNA's

"Architectural Sheet Metal Manual."

3.7.4 Fabricate in minimum 120-inch-long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

3.7.5 Install lap type gutter expansion joints at center of continuous runs exceeding 50’ in length, per SMACNA Figure 1-6.

3.7.6 Furnish and install gutter brackets spaced 36 inches O.C. fabricated from aluminum flat bar.

3.7.6.1 Form gutter brackets from 3/16” x 1” aluminum flat bar. Wrap three sides of straps with pre-finished metal matching color of gutter.

3.7.7 Furnish and install gutter spacers spaced 36 inches O.C. staggered off of gutter brackets 18” O.C. fabricated from 1/8” x 1” aluminum flat bar.

3.7.8 Fabricate downspouts to be 4” x 4” in accordance with SMACNA Figure 1-32B with flat lock or s-lock seams. Flair ends of downspout tube to receive higher lengths of downspout.

3.7.9 Downspout Straps for shall be fabricated in accordance with SMACNA Figure 1-35C.

3.7.9.1 Form downspout straps from 1/8” x 1” aluminum flat bar, spaced at ± 5 feet O.C. Wrap three sides of straps with pre-finished metal matching color of downspouts.

3.7.10 Apply sealant between flat surface of Downspout Straps and walls, prior to securing.

3.7.11 Provide elbows and splash blocks at outlets where required to direct water away from building.

3.7.12 Where downspouts drain onto adjacent roof areas, provide new metal splash pans below downspout outlet.

3.7.13 Where downspouts at grade do not tie into existing sub-grade drainage system, provide new concrete splash pans below downspout outlet.

3.8 FABRICATION AND INSTALLATION OF NEW COUNTER FLASHINGS AND RECEIVERS:

3.8.1 Form and install new two-piece counter flashing metal with lap in joints a minimum of 3 inches and lock joint lap. Notch and lap counterflashing sections a minimum of 3 inches.

3.8.2 At equipment curbs, form counter flashings with a minimum 1-½” flange that rests on top of the curb and secure to the top of the curb with roofing nails spaced at 6” O.C.

3.8.3 At masonry walls, remove existing raggle mounted counter flashing and clean out reglet to receive new counter flashing. Install counter flashing with lead wedges at 6” O.C. Apply sealant to reglet once receiver and wedges have been installed.

3.8.4 After counterflashing receiver has been installed, pop rivet new counter flashing to receiver at 6” O.C.

3.9 FABRICATION AND INSTALLATION OF NEW METAL THROUGH PARAPET OVERFLOW SCUPPERS:

3.9.1 Form and install new metal Through Parapet Overflow Scupper in accordance with SMACNA Architectural Sheet Metal Manual Figure 1-26A & B for overflow scupper and Project Drawings. Lock and solder all joints and seams.

3.9.2 Cover all concrete, masonry or wood surfaces to be in contact with the scupper with a bed of black plastic roofing cement.

3.9.3 Apply asphalt primer to top and bottom of scupper flanges and allow drying before installation in wall.

3.9.4 Secure scupper flanges to the inside face of parapets with specified fasteners.

3.9.5 Install an exterior closure flange before installation of scupper liner.

3.9.6 Strip scupper flanges with one stripping ply and cover with the base flashing membrane, both applied in manufacturer’s recommended flashing adhesive.

3.10 FABRICATION AND INSTALLATION OF NEW EXPANSION JOINT COVER:

3.10.1 Form and install new metal expansion joint cover in accordance with the Project Drawings and in accordance with SMACNA Architectural Sheet Metal Manual (7th Ed.) Figure 5-5 A.

3.10.2 Install new fiberglass batt insulation inside polyethylene envelope fold between the wood blocking members and/or the adjacent construction.

3.10.3 Install new metal expansion joint cleat and fasten to substrate with fasteners at 4“ O.C. staggered.

3.10.4 Prior to the application of the expansion joint cover, install a strip of 20-mil PVC flashing in as long a strip as practical over the flange and insulation envelope. Lap ends 6” minimum and cement with flashing cement.

3.10.5 Use maximum 10’ sections with minimum number of sections in each straight run. Form 1” standing seam at ends of sections and seal.

3.10.6 At roof-to-wall expansion joint conditions, extend joint covers up the vertical face and terminate below coping cap or counter flashing. Attach vertical face to substrate with appropriate fasteners at maximum spacing of 12” O.C. and do not attach through end laps.

3.10.7 Lap ends of sections 4” and apply three parallel rows of sealant over the sloped face of the cover and up the vertical surface of the cover.

3.10.8 Tong the expansion joint cap over the expansion flange, leaving 1” between the flange and the cap to allow for structural movement.

3.10.9 Tonged end of the expansion joint cover should have a 1.5” coverage over the expansion flange and 1” between the edge of the expansion joint cover and inside face of the curb.

3.11 FABRICATION AND INSTALLATION OF NEW PIPE HOUSING:

3.11.1 Fabricate new pipe housing in accordance with Project Drawings.

3.11.2 Fabricate new pipe housing with a water-tight, removable top, fastened to the housing with sheet metal screws with metal capped neoprene washers, spaced at 8” centers.

3.11.3 Fabricate pipe housing with all services penetrating the sides or ends of the housing. No penetrations will be permitted thru the top of the housings.

3.11.4 Fabricate with all joints and seams locked and soldered.

3.11.5 Fabricate with 4” wide horizontal flanges. Prime top and bottom of flanges with asphalt primer and allow to dry prior to installation.

3.11.6 Install new pipe housing on top of new base ply in a solid bed of roof cement.

3.11.7 Fasten thru base ply to previously installed wood blocking using minimum 1-1/4” ring shank, stainless steel nail, spaced at 3” centers, staggered.

3.11.8 Strip pipe housing flange with one stripping ply and cover with the cap sheet membrane, both applied in manufacturer’s recommended flashing adhesive.

3.12 FABRICATION AND INSTALLATION OF NEW COUNTER FLASHINGS AND RECEIVERS:

3.12.1 Form and install new two-piece counter flashing metal with lap in joints a minimum of 3 inches and lock joint lap. Notch and lap counterflashing sections a minimum of 3 inches.

3.12.2 At equipment curbs, form counter flashings with a minimum 1-½” flange that rests on top of the curb and secure to the top of the curb with roofing nails spaced at 6” O.C.

3.12.3 At masonry walls, remove existing raggle mounted counter flashing and clean out reglet to receive new counter flashing. Install counter flashing with lead wedges at 6” O.C. Apply sealant to reglet once receiver and wedges have been installed.

3.12.4 After counterflashing receiver has been installed, pop rivet new counter flashing to receiver at 6” O.C.

3.13 FABRICATION AND INSTALLATION OF NEW MISCELLANEOUS FLANGED FLASHINGS:

3.13.1 Prime with asphalt primer top and bottom surfaces, set flange over base ply membrane in solid bed of black plastic roof cement. If flange width exceeds 12 inches, secure it to previously installed plywood sheathing with suitable fasteners placed near each corner and at the center of each side.

3.13.2 Install one stripping ply of base ply membrane. Fit stripping plies snugly to the vertical flange. Extend ply at least six inches beyond the flange.

3.13.3 Extend flashings a minimum height of 8” up the vertical surface.

END OF SECTION 07620

SECTION 09900

PAINTING

PART 1 GENERAL

1.1 WORK INCLUDED

1.1.1 Wire brush, prime and paint existing roof hatch.

1.1.2 Wire brush, prime, and paint existing mechanical screens (Alternate Bid No. 3)

1.2 RELATED WORK SPECIFIED ELSEWHERE

1.2.1 Reroofing Removals & Preparations – Section 07591

1.3 QUALITY ASSURANCE

1.3.1 Qualifications of the Manufacturer: Products used in the work of this section shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful production acceptable to the Consultant.

1.3.2 Qualifications of the Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and are completely familiar with the specified requirements and the methods needed for the proper performance of the work in this section.

1.4 SUBMITTALS

1.4.1 Product data

1.4.1.1 Submit complete list of products proposed for use to Roof Consultant at least 30 days prior to commencement of painting work.

1.4.1.2 Indicate manufacturer, brand name, quality, and type paint for each surface to be finished.

1.4.2 Color samples: Submit two sets of color samples from paint/coating manufacturers' standard colors, for color selections by Roof consultant.

1.4.3 Brush-outs

1.4.3.1 Following issuance of final color schedule, prepare actual brush-outs for each paint, stain, or finish specified.

1.4.3.2 Submit brush-outs in duplicate; minimum size of 120 sq. in.

1.4.3.3 Apply products in number of coats specified for actual work.

1.5 STORAGE AND HANDLING

1.5.1 Store materials in Contractor's designated storage area.

1.5.2 Maintain neat, clean conditions in storage area; remove rags and waste materials at end of each day's work.

1.5.3 Close containers at end of day's work. Leave no materials open.

1.6 JOB CONDITIONS

1.6.1 Environmental requirements

1.6.1.1 Comply with manufacturer's recommendations regarding environmental conditions under which materials may be applied.

1.6.1.2 Apply no materials in spaces where dust is being generated.

1.6.2 Protection: Cover finished work of other trades, prefinished items, and surfaces not being painted concurrently.

1.6.3 Safety precautions

1.6.3.1 Provide temporary fire protection equipment in materials storage area.

1.6.3.2 Prohibit smoking in storage area.

1.7 SCOPE OF WORK

1.7.1 Roof Access Hatches: All exposed metal of the roof hatch.

1.7.2 Mechanical screens (Alternate Bid No. 3): All mechanical screens on all RAs as noted in this specification and on the Drawings

PART 2 PRODUCTS

2.1 PAINTING MATERIALS

2.1.1 Acceptable manufacturers: Except as otherwise noted, products specified as a standard of quality and color are manufactured by Sherwin-Williams Co. Products of the following manufacturers equal in type, quality, and color are acceptable for use, subject to approval of product list by Roof Consultant.

2.1.1.1 Rose-Talbert Paints

2.1.1.2 Devoe Paint

2.1.2 Industrial Urethane Alkyd: Industrial Urethane Alkyd Enamel is a high-solids, high gloss, 2.8 lb/gal VOC compliant coating intended for interior/exterior use in industrial environments, such as B54-150 Series, as manufactured by Sherwin-Williams Co.

2.1.2.1 Roof Hatch: Paint color will be Sherwin-Williams 4008 Umbra.

2.1.2.2 Mechanical Screens (Alternate Bid No. 3): Paint color will be determined and approved by Owner and Roof Consultant during pre-construction.

2.1.3 Where products other than those of the manufacturer listed as the standard quality are specified in the Painting Schedule, such products have been selected to achieve specific results and substitutions will be allowed only if specifically

approved by the Roof Consultant.

2.1.4 See Paragraph 3.3 Painting Schedule for specific product information by application criterion.

2.1.5 Miscellaneous materials:

2.1.5.1 Primer: Kem Bond HS Primer

2.1.5.2 Paint thinners and tints shall be products of same manufacturer as paints or if approved by manufacturer for use with his products.

2.1.5.3 Shellac, turpentine, patching compounds, and similar materials required for execution of work shall be pure, best quality products.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 After the new roof has been installed and gas piping reconnected and checked for leaks, prepare the existing gas piping and couplings to receive new paint.

3.1.2 Protect the surface of the existing roof areas to remain and the new roof membrane while preparing and painting the existing carbon steel components.

3.1.3 Surfaces to receive finishes shall be free of debris, oils, rust, dust, or other deleterious materials.

3.1.4 Roof Hatch:

3.1.4.1 Remove rust and unsound metal back to sound material with scraper or wire brush.

3.1.4.2 Wash with xylol to remove grease, oil, and contaminants. Wipe dry with clean cloth.

3.1.5 Mechanical Screens (Alternate Bid No. 3)

3.1.5.1 Remove rust and unsound metal back to sound material with scraper or wire brush.

3.1.5.2 Wash with xylol to remove grease, oil, and contaminants. Wipe dry with clean cloth.

3.2 APPLICATION

3.2.1 Apply paint materials using clean brushes, rollers, or spraying equipment

3.2.2 Apply materials at rate stated on label placed on can by paint manufacturer for type surface being painted.

3.2.3 Comply with manufacturer's recommendations for drying time between coats.

3.2.4 Finish coats shall be smooth, free of brush marks, streaks, laps, or pileup of paint.

3.2.5 Do not apply additional coats until completed coat has been inspected by Roof Consultant. Only inspected coats of paint will be considered in determining number of coats applied.

3.2.6 The quantities of coats listed in the Painting Schedule are the minimum. Contractor is responsible for application of any additional coats necessary to achieve required coverage and color uniformity.

3.3 PAINTING SCHEDULE

3.3.1 Exterior Surfaces - Field Applied

3.3.1.1 Urethane Alkyd Enamel Gloss

3.3.1.1.1 1st Coat: Kem Bond HS Primer

3.3.1.1.2 2nd Coat: Pro Industrial Urethane Alkyd Enamel

3.3.1.1.3 3rd Coat: Pro Industrial Urethane Alkyd Enamel

END OF SECTION 09900

SECTION 15882

CONDENSATE DRAIN PIPING FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

1.1.1 This Section includes condensate drain piping for HVAC units.

1.2 SUBMITTALS

1.2.1 Product Data: For each product indicated include a material and manufacturers list on Contractor's letterhead with appropriate minimum standards referenced.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 ¾", 1" & 2" Type "L" copper piping and appropriate fittings, reducers, enlargers and elbows, as required; as manufactured by Mueller Industries, Collierville, TN, or equal.

2.1.2 Condensate Drain Support: MIRO 1.5 supports, as manufactured by MIRO Industries, Sandy, Utah, 800-768-6978.

PART 3 EXECUTION

3.1 EXISTING CONDENSATE DRAIN PIPING

3.1.1 Cut vertical leg of the existing copper condensate drain piping after the "P" trap and safely store copper piping for reinstallation after the new roof assembly is complete.

3.1.2 After installation of the new roof assembly is complete, cut the existing copper condensate drain piping to accommodate the new roof assembly and reconnect to the unit with a new copper fitting. Solder joints where copper condensate drain piping is reconnected.

3.1.3 Replace any damaged or missing components in the existing copper condensate drain piping with new copper components to match existing.

3.1.4 Terminate condensate drain piping at internal roof drains or at gutters with 90º elbows, outlet down. Secure pipe to drain strainer basket or to gutter spacers with stainless steel wire.

3.1.4.1 If more than one condensate drain can be tied together, provide cold connection of 1" copper drain line into 2" copper drain piping collection system.

3.1.5 Support 1" and 2" drain piping collection system at 5' O.C. using MIRO 1.5 supports.

3.1.6 Set condensate drain support stand in a bed of utility cement on a sacrificial cap sheet membrane, which extends a minimum of 4” beyond the condensate drain pipe support base in all directions. Sacrificial cap sheet membrane shall be spot adhered to the cap sheet surfacing.

END OF SECTION 15882