

**ANNE ARUNDEL COUNTY, MARYLAND  
DEPARTMENT OF PUBLIC WORKS**

**CFSU – Heritage Complex HVAC  
PROPOSAL NO. C537896  
PROJECT NO. C537800**

**ADDENDUM NO. 2**

**March 21, 2024**

To Bidders:

This Addendum No. 2 is hereby made a part of the contract documents on which the contract will be based, and is issued to modify, explain and/or correct the original contract documents. Please attach this Addendum to your contract documents and submit bids and be otherwise governed accordingly. Receipt of this Addendum must be acknowledged on Page A4-3 of the Proposal Form.

**CHANGES TO CONTRACT SPECIFICATIONS:**

**1. SECTION 0 – Procurement and Contracting Requirements**

a. REPLACE the first paragraph of the Notice to Contractors with the following, Sealed bids, addressed to Anne Arundel County, Bid No. C537896, for the CFSU – Heritage Complex HVAC Project for the Department of Public Works will be received until 1:30 P.M. local time, **Tuesday, April 9, 2024**, electronically through the County's PORT system, after which they will be opened and publicly read via ZOOM.com. You may join the Zoom meeting for the date and time set on the solicitation. However, the reading of bids will begin approximately 15 minutes after the deadline for submitting them to give staff enough time to assemble the bid responses. Please join the bid opening using the credentials listed below:

b. REPLACE the first paragraph of the Information to Bidders with the following, Sealed bids, addressed to the Purchasing Agent, Anne Arundel County, Maryland, for construction of the . CFSU – Heritage Complex HVAC Project as shown on drawings on file in the Office of the Department of Public Works, Heritage Office Complex, 2662 Riva Road, Annapolis, Maryland 21401 will be received electronically through the County's PORT system until **Tuesday, April 9, 2024** at 1:30 p.m. after which they will be opened and publicly read via ZOOM.com You may join the ZOOM meeting for the date and time set on the solicitation. However, the reading of bids will begin approximately 15 minutes after the deadline for submitting them to give staff sufficient time to assemble the bid responses. Please join the bid opening using the credentials listed below:

**2. Section 0 – Proposal**

Replace Page A4-3 and A4-4, with New page A4-3, A4-4, and A4-5 dated March 21, 2024.

**3. Section 237313 -**

- a. ADD the attached new Section 237313

**CHANGES TO CONTRACT DRAWINGS:**

1. Drawing G000 “Title Sheet and Drawing Index”.
  - a. Replace with attached new Drawing G000
2. Drawing M101A “Mechanical HVAC Building 2660 Roof Plan – New Work “
  - a. Add attached new Drawing M101A
3. Drawing M102A “Mechanical HVAC Building 2662 Roof Plan – New Work”
  - a. Add attached new Drawing M102A
4. Drawing M103A “Mechanical HVAC Building 2664 Roof Plan – New Work”
  - a. Add attached new Drawing M103A
5. Drawing M104A “ Mechanical HVAC Building 2666 Roof Plan – New Work”
  - a. Add attached new Drawing M104A
6. Drawing M500 “Mechanical Details and Schedules”
  - a. Replace with attached new Drawing M500
7. Drawing M700 “Mechanical Control Sequences”
  - a. Replace with attached new Drawing M700

**BIDDER QUESTIONS:**

<b>Questions</b>	<b>Response</b>
E102 note 8, states to add this item under alternate 1/2. Which alternate does this apply to as 1 is for duct mount which would need installed on the 4 <sup>th</sup> floor ceiling space and the other is unit mount? Do we add it for each alternate?	Note #8 applies to both alternates. A single circuit will be pull to the junction box and serve both alternates. This applies to E101-104 drawings.
There is no place on the bid form for alternates	Will be addressed in this Addendum
BOD manufacturer is stating 25 weeks from approved submittal. 270 days is not enough time for contracts, submittals coordination and approvals. Can this be extended?	Will be addressed in this Addendum
The existing curb is approximately 240” long. The new BOD unit and curb is 331” long. Does the manufacturer plan to incorporate a transition in their curb adapter to offset this almost 90” difference? With a 90” difference the curb adapter may need	The additional height is not a concern.

to be at least 36" high.	
Is there an as-built on what these existing units feed? ( i.e different floors, quads etc)	No but the design team can discuss with the contractor upon award.
Is pre balancing of the airflow required?	No, the final unit cfm shall be based on RTU maximum as stated on the design documents.
Please confirm the control contractor Easi is working under the Prime Contractor and not AA County Government.	The controls contractor will need to be hired by the winning contractor
What are the work hours in the evening while roughing in electric and balancing after completion?	Normal working hours, the work must be coordinated with the Construction Manager.
Does the existing roof have a warranty?	Yes, It's a Firestone Roofing system.
Is the intention to incorporate the duct openings within the curb adapter or to modify the existing ductwork itself?	The existing ductwork will require a new transition fitting but the existing riser ductwork in the shaft will remain intact.
Is there a cut sheet of the existing unit?	Existing unit information can be recovered once the contract is awarded.
Is a lift plan required for the crane?	Yes.
Is there an area where the employees in 1 of the areas be relocated temporarily as the awarded contractor remove 1 unit to see actual field conditions and get the proper measurements?	No
Is the pitch pocket new or as it was stated at the walkthrough to re-use existing.	The existing pitch pockets shall be reused. If a problem is found during construction ti shall be brought up to the Owner and engineer for consideration.
Is the existing ceiling tile manufacturer and model # known in case of damage?	It is not currently stated on the design documents but the information can be obtained from the County upon project award.
There was mention of new smoke dampers being installed throughout the building. Does the awarded contractor need to coordinate with this?	The existing dampers, and detectors are to remain and reconnect and interlocked with the RTU's. Electrical circuits and notation is shown on the design documents.
Are there any MBE requirements?	No Stated goals
Where does the condensate discharge to? Any particular support system for piping on the roof?	General note #3 indicates the routing design intention for the condensate piping. Standard pate piping supports shall be required.
Is there a controls specification for the CFSU Heritage Complex project? I am looking for more detail on what system manufacturer's and installers are approved for this project. The controls drawings do not contain this information.	Controls shall follow the controls drawings and section 237313.2.15
Could you please provide the estimated weights for the basis of design RTU units for the Heritage Complex project?	Approximate weight for the BOD unit and associated roof adaptor is 11,000 lbs
Will the contractor need to furnish temp construction toilets for	Yes, a temp construction toilet is required.

contractors?	
Are there any special crane requirements , lift plans ect.?	Yes, a lift pan is required.
Will a Gantt schedule be fine for this project?	Bar Chart will be required
Please confirm who holds the roof warranty?	The Roof is under warranty, it is a Firestone system.
Can we start refrigerant recovery on Friday for RTU removals on Saturday? If so, what time can we start?	You can take down the units starting at 5:00:00 PM on Friday and the units must be operational on Monday.
Please give an exact location for the Bipolar Ionization being that the supply-air plenums for RTU's are wall to wall tight in the hallways , please advise?	Bipolar ionization shall be installed in existing supply ductwork riser downstream of existing smoke detector and damper before any branch tap off for the fourth floor.
There's a device labeled TAMS-1 on the flow diagram on M700. Assuming that's an airflow monitoring station.	Correct.
TAMS-1 maybe be an air flow proving switch according to add alternate #1 sequence. Please clarify ?	TAMS-1 is a unit mounted air flow measuring station that will indicate total airflow to the building form the associated RTU
Regarding spec section 237313: spec lists Trane as base bid with York or Daikin as approved alternates. Will the bid form be adjusted to include separate pricing for alternate RTU manufacturers?	No, include the price for the unit that is being plan to be used. The RTU must meet all of the requirement in the specifications.
Per drawing M500 the cooling coil capacity for the Rooftop AHU is listed as 725 MBH total & 595 MBH sensible capacity, which is over 60 Tons. Per specification section 237313 2.1.A.1 the model number of RE50 is shown which equates to a 50 Ton nominal capacity unit. The M500 dimensions represent a 50 Ton Rooftop AHU box size. Can you verify the cooling coil capacity of the Rooftop AHU(total/sensible)?	The total cooling capacity for the unit shall be revised to 595 MBH and the sensible capacity shall be revised to 444 MBH. This equates to the unit being 50 tons.
Since Trane is not supplying the Total Airflow Monitoring Station (TAMS-1) and I'll need to supply that, is it the intent for this to be duct mounted or fan inlet mounted? If the duct mounted, I need the size of the duct.	Air flow monitoring system can be provided by the unit manufacturer within the unit discharge plenum or at the supply fan discharge point.
I also need the size of the duct for the Bi-Polar Ionization.	Supply and return duct sizes are listed in the general notes on each sheet.
Please confirm that prospective bidders do not need to complete or submit the Sales Tax Affidavit for this proposal. (Page A2-2)	Not required
The solicitation checklist and the table of contents make reference to Page B7-1, <i>List of Subcontractors &amp; Equipment Suppliers</i> , but the page is not included in the Project Manual Specs. Can Page B7-1 be provided with Answers to Questions?	The List of subcontractors and Equipment suppliers is required by lowest bidder only and will be requested after the bid.
Please specify which License Number is to be provided at the bottom of the <i>Prevailing Wage and Local Hiring Affidavit</i> .	The contractor license number is required.
Can electrical work and prep work be completed the week prior to the Friday through Monday morning timeline? (Pre-Bid Meeting #18)	The electrical work me be conducted during normal business hours and will be coordinated with the construction manager.

Re: C537896 Addendum 2

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Can additional site visits be scheduled in order for interested subcontractors to visit the building?	Yes, coordinate with the AACo PM.
Who is the controls contractor and what is their contact information?	The County currently has a contract with; Electrical Automations Services, Inc. (EASI), 3410 Mountain Rd. Pasadena, MD 21122, Phone: 410-437-3103 Toll Free: 877-538-3274 Fax: 410-437-3163

*David C. Braun*

David Braun, Engineer Administrator, MS 7301

**ANNE ARUNDEL COUNTY  
DEPARTMENT OF PUBLIC WORKS  
ANNAPOLIS, MARYLAND**

**CFSU – Heritage Complex HVAC  
Proposal No.: C537896  
Project No.: C537800**

DATE: \_\_\_\_\_

This is to certify that \_\_\_\_\_ has received Addendum No. \_\_\_\_\_ through \_\_\_\_\_ and this bid reflects the changes created by these addenda.

THE CONTRACTOR OR ANY SUBCONTRACTOR ON THIS WORK WILL BE REQUESTED TO COMPLY WITH EXECUTIVE ORDER 11246, ENTITLED "EQUAL EMPLOYMENT OPPORTUNITY" AS AMENDED BY EXECUTIVE ORDER 11375, AND AS SUPPLEMENTED IN U.S. DEPT. OF LABOR REGULATIONS (41 CRF PART 60).

Bidder's Names: \_\_\_\_\_

Bidder's Signature: \_\_\_\_\_

Bidder's Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Bidder's Email Address: \_\_\_\_\_

Item	Description	Unit Size	Estimated Quantity	Unit Price Dols / Cts	Total Price Dols / Cts
1	All work described in the contract drawings and specifications.	LS	LS		

BASE BID: \_\_\_\_\_

\_\_\_\_\_ \$ \_\_\_\_\_

**BID Alternate**

Item	Description	Unit Size	Estimated Quantity	Unit Price Dols / Cts	Total Price Dols / Cts
A1	Add Alternate – UV Air Disinfection as described in the contract drawings and specifications.	LS	LS		
A2	Add Alternate – Bipolar Ionization as described in the contract drawings and specifications.	LS	LS		
A3	Add Alternate - a RTU option that has no factory controls. The mechanical contractor will supply and install a unit that has a "Minimal Controls" option, and the controls will be installed by a controls contractor. Control for the unit are still included in the project as a whole but shall not be factory installed. The Contractor shall provide a unit that is fully capable of being control by the Owner. Unit performance and construction quality shall be provided.	LS	LS		

TOTAL BID (Base Bis+A1+a2+A3): \_\_\_\_\_

\_\_\_\_\_  
\$ \_\_\_\_\_

BID PRICE MUST BE WRITTEN AND SHOWN IN NUMBERS, IN CASE OF DISCREPANCY THE WRITTEN AMOUNT WILL SUPERSEDE.

Total time for completion, 320 consecutive calendar days.  
Liquidated damages shall be, \$500.00 dollars per calendar day.

Basis of Award

The award of the Contract shall be in accordance with Section GP 3.0 of the Anne Arundel County Government January 2001 "Standard Details and Specifications for Construction" and any subsequent revisions thereto and based on lowest Total Bid.

\_\_\_\_\_  
(Bidder)

By: \_\_\_\_\_  
(Title)

In accordance with the County Code, Article 8-2-117(a)7, please list any affiliation with a County employee(s) or official(s) (Write "none" if there are no affiliations.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**SECTION 237313.Alt 3**

**ROOF MOUNTED AIR HANDLING UNITS (ADD ALTERNATE 3)**

**PART 1 - GENERAL**

**1.1 REFERENCE STANDARDS**

- A. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality; 2016.
- B. ASTM B177/B177M - Standard Guide for Engineering Chromium Electroplating; 2011.
- C. UL 508 - Industrial Control Equipment; Underwriters Laboratories Inc; Current Edition, Including All Revisions.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

**A. GENERAL**

- 1. Manufacturer of packaged unitary rooftop products shall have had a minimum of five years successful experience in the manufacture and service support of the rooftop packages. Manufacturers with less than five years experience in the production of rooftop units shall not be acceptable.

**APPROVED MANUFACTURERS (ADD ALTERNATE 3)**

- 1. VALENT Air Corporation
  - 2. Daikin
  - 3. JCI/York
  - 4. Substitutions: [Prior approval required] as indicated under the general and/or supplemental conditions of these specifications.
- B. Base bid shall be VALANT packaged rooftop air conditioning units with approved alternate being York, or Daikin. Alternates must still comply with the performance and features as specified herein and as indicated on the design documents. Job will be awarded on basis of specified product. Substitutions must be selected and approved within 14 calendar days after award of contract.

## 2.2 GENERAL UNIT DESCRIPTION

- A. Unit(s) furnished and installed shall be packaged rooftops as specified on the contract documents and within these specifications. Cooling capacity ratings shall be based upon AHRI Standard 340/360. Unit(s) shall consist of insulated weathertight casing with compressors, air cooled condenser coil, condenser fans, evaporator coil, filters, supply and/or relief fan motors and drives, and unit controls. The Add Alternate 3 unit shall be purchased with a “no controls” options. The contractor is still completely responsible for the complete control of the unit as indicated on the controls design documents. The controls for this unit shall be contracted through the County’s current on call controls contractor, EASI Controls. The general contractor is responsible for relying all information of the indicated controls document to EASI for complete extent of work. The overall contractor BID price shall include the controls contractor’s cost to complete the design intent on the documents.
- B. Package units shall be constructed for installation on a roof curb providing full perimeter support under air handler section and pedestal support under condenser section. Curb adaptors are acceptable and shall be provided with the equipment as required.
- C. Unit(s) shall be factory run tested to include the operation of all fans, compressors, heat exchangers, and control sequences.
- D. Unit(s) shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.

## 2.3 UNIT CASING

- A. Materials: Formed, double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.
  - a. Unit’s exterior shall be supplied from the manufacturer using G60 galvaneal steel with proprietary pre-painted material in the following finish color; Concrete Gray-RAL 7023. This has been subjected to a salt spray test per ASTM-B117 and evaluated using ASTM-D714 and ASTM-D610 showing no observable signs of rust or blistering until reaching 2,500 hours. Uncoated galvanized steel exterior is not acceptable.
  - b. Internal assemblies: 24 gauge, galvanized (G90) steel except for motor supports which shall be minimum 14 gauge galvanized (G90) steel.
- B. Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
  - a. Materials: Rigid urethane injected foam. Foam board not acceptable.
    - i. Thickness: 2 inch (50.8 mm)
    - ii. Thermal Resistance R13
    - iii. Thermally broken
    - iv. Meets UL94HF-1 flame requirements.
    - v. Location and application: Full coverage of entire cabinet exterior to include walls, roof of unit, unit base, and doors.

- b. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
  - i. Thickness: 2 inch (50.8 mm)
  - ii. Thermal Resistance R8
  - iii. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.
  - iv. Location and application: Divider panels between outdoor air and return air/exhaust air streams.
- c. Roof Insulation: 2 inch (50.8 mm) fiberglass located above the 1 inch (25.4 mm) foam panel.
- d. Access panels / doors: Unit shall be equipped with insulated, hinged doors or removable access panels to provide easy access to all major components. Doors and access panels shall be fabricated of 22 gauge galvanized G90 steel or painted galvanized steel.
- e. Supply Air blower assemblies: Blower assembly shall consist of an electric motor and direct-drive fans. Assembly shall be mounted on heavy gauge galvanized steel rails and further mounted on 1.125 inch thick neoprene vibration isolators. Blower motors shall be capable of continuous speed modulation and controlled by a VFD.
- f. Exhaust Air blower assemblies: Blower assembly shall consist of an electric motor and a direct-drive fan. Assembly shall be mounted on heavy gauge galvanized steel rails and further mounted on 1.125 inch thick neoprene vibration isolators. Blower motor shall be capable of continuous speed modulation and controlled by a VFD.
- g. Evaporator Coil: Evaporator coil shall be (silver) soldered or brazed into the compressed refrigerant system. Coil shall be constructed of copper tubing, permanently bonded to aluminum fins and enclosed in a galvanized steel frame. If two compressors are used as components of the unit, then the evaporator coil shall be of "interlaced" configuration, permitting independent operation of either compressor without conflict with the other compressor.
- h. Control panel / connections: Units shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections. RTU shall be equipped with a Unit Disconnect Switch. Electric heater shall have single point power.
- i. Condensate drain pan: Drain Pan shall be an integral part of the unit whenever a cooling option is included. Pan shall be formed of welded austenitic stainless steel sheet material and provided with a welded stainless steel drain connection at the front for connection to a P trap. Drain pan shall be sloped in two directions to provide positive draining and drain connector shall be sealed at penetration through cabinet wall.
- j. P trap: If the unit is equipped with a condensate drain pan, contractor shall provide, or fabricate, and install an appropriate P trap, in accordance with all local and area codes and Best Practices.

- k. Electric Post-heater: Post-heater shall be SCR control and shall include a temperature sensor with field adjustable set point, located in the outdoor air stream. Heat output of the post-heater shall be infinitely variable.
- l. Packaged DX System: Unit shall have an integral compressor(s) and evaporator coil located within the weather-tight unit housing. Condenser coils and appurtenant condenser fan assemblies shall be factory installed as integral subassemblies of the unit and mounted on the exterior of the unit. Lead condenser fan shall have EC motor to maintain condenser pressure at part load conditions. Motors shall be UL Recognized and CSA Certified. The lead refrigerant compressor(s) shall be inverter hermetic scroll-type and shall be equipped with liquid line filter drier, thermostatic expansion valves (TXV)(s), manual reset high pressure and low pressure cutouts and all appurtenant sensors, service ports and safety devices. Compressed refrigerant system shall be fully charged with R-410A refrigerant. Compressors shall be mounted within an insulated access compartment and on a raised cabinet shelf to reduce sound and vibration. Each compressor shall be factory-equipped with an electric crankcase heater to boil off liquid refrigerant from the oil.
- m. Condenser Fans: Fan blades must be constructed of aluminum or a composite material and have a geometry designed and documented to reduce sound and energy when compared to a traditional rectangular blade fan. Traditional rectangular blade fans are not allowed due to increased noise generated and increase power utilized. Condenser fan motors shall be three phase, external rotor, type 56 frame, open air over and shaft up. Each condenser fan motor shall have a vented frame, rated for continuous duty and be equipped with an automatic reset thermal protector. Lead condenser fan(s) will have an electronically commutated (EC) motor that will modulate to maintain a head pressure set point.] Motors shall be UL Recognized and CSA Certified. Single condenser fan running at max RPM and design static pressure shall not exceed an A-weighted sound power level of 75 db at free inlet/outlet test conditions.
- n. Packaged DX Control and Diagnostics: The Packaged DX system shall be controlled by an onboard digital controller (DDC) that indicates both owner-supplied settings and fault conditions that may occur. The DDC shall be programmed to indicate the following faults:
  - i. Global alarm condition (active when there is at least one alarm)
  - ii. Supply Air Proving alarm
  - iii. Compressor Trip alarm
  - iv. Compressor Locked Out alarm
  - v. Supply Air Temperature Low Limit alarm
    - 1. Sensor #1 Out of Range (outside air temperature)
    - 2. Sensor #2 Out of Range (supply air temperature)
    - 3. Sensor #3 Out of Range (cold coil leaving air temperature)
- o. Phase and brownout protection: Unit shall have a factory-installed phase monitor to detect electric supply phase loss and voltage brown-out conditions. Upon detection of a fault, the monitor shall disconnect supply voltage to all motors.

- p. Motorized dampers / Intake Air, Motorized dampers of low leakage type shall be factory installed.
- q. Motorized Recirculating Air Damper designed to permit 100% recirculation of exhaust air shall be factory installed.

#### 2.4. BLOWER

- A. Blower section construction, Supply Air: direct drive motors and blowers shall be assembled on a 14 gauge galvanized steel platform and shall be equipped with 1.125 inch thick neoprene vibration isolation devices.
- B. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.
- C. Fan: Direct drive, airfoil plenum fan with steel wheel statically and dynamically balanced. Prop or belt-drive fan not acceptable due to low static capabilities.
- D. Blades: Painted steel blades only.
- E. Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating".

#### 2.5. MOTORS

- A. General: Blower motors greater than 1/2 horsepower shall be "NEMA Premium" unless otherwise indicated. Compliance with EPart minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure.
- B. Motors shall be 60 cycle, 3 phase 460 volts.

#### 2.6. FILTERS

- A. Unit shall have permanent 2 inch (50.8 mm) aluminum filters located in the outdoor air intake and shall be accessible from the exterior of the unit. MERV 14 with MERV 8 disposable pleated pre-filters shall be provided in the supply air stream.

#### 2.7 ELECTRICAL POWER CONNECTIONS

- A. Provide Phase Voltage Monitor. Shall protect 3-phase equipment from phase loss, phase reversal and phase imbalance. Any fault condition shall produce a Failure Indicator LED and send the unit into an auto stop condition.
- B. Provide Unit Interrupt Rating (Short Circuit Current Rating-SCCR). A 5,000 Amp rating Amp rating shall be applied to the unit enclosure using a non-fused circuit breaker for disconnect switch purposes. Fan motors, compressors, and electric heat circuits shall be provided with series rated circuit breakers that will provide the unit rated level of protection. The unit shall be marked with approved cULus markings and will adhere to cULus regulations
- C. Provide Non-Fused Disconnect. External handle mounted on the control box door shall be provided to disconnect unit power with the control box door closed for safety.

- D. Provide unit mounted 115 volt convenience outlet. Shall be wired and powered from a factory mounted transformer. Unit-mounted, non-fused disconnect with external handle shall be furnished with factory powered outlet.
- E. Unit shall be single point power.

## 2.8 ELECTRIC HEATING SECTION

- A. All electric heat models shall be completely assembled and wired. Electric heat control shall be fully integrated with the unit controls. Elements shall be heavy duty nickel chromium and internally wired. Automatic reset high limit control shall operate through heater.
- B. Electric heat models shall include modulating SCR control.

## 2.9 EVAPORATOR COIL SECTION

- A. Provide heavy duty aluminum fins mechanically bonded to copper tubes. Evaporator coil shall be inter-circuited to maintain active coil face area at part load conditions. Coil shall also utilize internally enhanced tubing for maximum efficiency.
- B. Provide electronic expansion valve. Shall be electronically controlled by the unit controller. This fully integrates expansion valve control with unit operation to ensure optimal equipment reliability and efficiency. Expansion valves shall be 2500 step valves for precise refrigerant control and shall be driven closed during off cycles to minimize refrigerant migration and protect compressors. Valve position shall be displayed at the user interface to assist field diagnostics.
- C. Provide stainless steel pressure transducer. Shall provide accurate measurement of high and low side refrigeration system pressure over the entire operating range. System pressures and saturation temperatures shall be displayed at the user interface to improve field diagnostics. The transducer is accessible as it shall be located close to the compressor manifold set. Durable weather proof automotive grade electrical connectors shall be used to ensure reliability.
- D. Provide sloped stainless steel drain pan to assure positive drainage of condensate from the unit casing.

## 2.10 AIR-COOLED CONDENSER SECTION

- A. Condenser coils shall have all Aluminum Microchannel coils. All coils shall be leak tested at the factory to ensure pressure integrity. The condenser coil is pressure tested to 650 psig. Subcooling circuit(s) shall be provided as standard.
- B. Provide subcooling circuit(s) integral with condenser coils to maximize efficiency and prevent premature flashing of liquid refrigerant, to a gaseous state, ahead of the expansion valve.

- C. Provide vertical discharge, direct drive, condenser fans with aluminum blades and zinc plated steel hubs. Condenser fan motors shall be three-phase motors with permanently lubricated ball bearings, built-in current and thermal overload protection and weather-tight slingers over motor bearings.
- D. Provide factory-installed louvered steel hail/vandal guards around perimeter of condensing section to protect the condenser coils, refrigerant piping and control components from damage resulting from hail, flying debris, and vandalism. Louvered panels shall be fabricated from heavy gauge, pre-painted galvanized steel with a baked, polyurethane enamel finish, and be rigid enough to provide permanent protection for shipping and pre-/post- installation.

#### 2.11 REFRIGERATION SYSTEM

- A. Compressor shall be industrial grade, energy efficient direct drive 3600 RPM speed scroll type. The motor shall be of a suction gas cooled hermetic design. Compressor shall have a centrifugal oil pump with dirt separator, oil sight glass, and oil charging valve. Crankcase heaters will be standard on each compressor to minimize amounts of liquid in the oil sump when unit is off.
- B. Provide with thermostatic motor winding temperature control to protect against excessive motor temperatures resulting from over-/under-voltage or loss of charge. Provide high and low pressure cutouts, and reset relay.
- C. Provide factory-installed compressor lockout thermostat to prevent compressor operation at low ambient conditions.
- D. Provide coil frost protection compressor unloading based on refrigerant circuit suction temperature to prevent coil frosting with minimum energy usage.
- E. Variable speed compressors shall be capable of speed modulation from 25 Hz to a maximum of 100 Hz. The minimum unit capacity shall be 15% of full load or less. The compressor motor shall be a permanent magnet type. Each compressor shall have a crankcase heater installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles. Compressors shall be equipped with a bearing oil injection system that optimizes bearing and scroll set lubrication, sealing, and controls the oil circulation rate. Optimal bearing lubrication shall be provided by an oil pump.
- F. Each variable speed compressor shall be matched with a specially designed variable frequency drive which modulates the speed of the compressor motor and provides several compressor protection functions. Control of the variable speed compressor and inverter shall be integrated with the unit controller to ensure optimal equipment reliability and efficiency.
- G. F. Provide high efficiency units that shall meet ASHRAE 189.1-2011 and Consortium for Energy Efficiency (CEE) Advanced Tier Commercial Unitary AC and HP Specification for utility rebate requirement

- H. Provide Compressor Isolation Valves. Factory installed valves both upstream and downstream of each compressor set shall enable isolation of compressors from the rest of the refrigeration system if service is required.

## 2.12 RELIEF SECTION

- A. Provide Relief Fan – Direct Drive & Variable Speed with Statitrac Control. The eDrive™ relief fan shall be a minimum of two single-width, single-inlet, 5-blade direct-drive plenum fans with backward inclined, high efficiency welded aluminum impeller that is dynamically balanced as an assembly. Fan shall be beltless and maintenance free throughout its operating life. Fan shall be balanced to G6.3 per AMCA 204. Entire fan assembly shall be completely isolated from unit and fan board by 2" deflection spring isolation. Motor shall contain power electronics for speed control and be managed by the equipment controller.
- B. The modulating relief discharge dampers and ECM shall be modulated in response to building pressure. A differential pressure control system, (Statitrac™), shall use a differential pressure transducer to compare indoor building pressure to outdoor ambient atmospheric pressure. The relief fan shall be turned on when required to lower building static pressure setpoint.
- C. The (Statitrac™) control system shall then modulate the discharge dampers and ECM to control the building pressure to within the adjustable, specified dead band that shall be adjustable at the human interface panel.
- D. Provide Ventilation Override Mode. With the ventilation override module installed, the unit shall be programmed to transition to up to 5 different programmed sequences for Smoke Purge, Evacuation, Pressurization, Purge, Purge with duct control sequence and Unit off. The transition shall occur when a binary input on the VOM is closed (shorted); this would typically be a hard wired relay output from a smoke detector or fire control panel.

## 2.13 OUTDOOR AIR SECTION

- A. Provide 0-100 Percent Modulating Economizer. Shall be operated through the primary temperature controls to automatically utilize OA for "free" cooling. Automatically modulated return and outside air dampers shall maintain proper temperature in the space. Economizer shall be equipped with an automatic lock out when the outdoor high ambient temperature is too high for proper cooling.
- B. Minimum position control shall be standard and adjustable at the Human Interface Panel or with a remote potentiometer or through the building management system. A spring return motor shall ensure closure of OA dampers during unit shutdown or power interruption. Mechanical cooling shall be available to aid the economizer mode at any ambient.
- C. Provide demand control ventilation (DCV) system fully integrated with unit economizer. Controller shall minimize fresh air intake during periods of low occupancy based on parts per



million space CO<sub>2</sub> in response to a customer defined parts per million CO<sub>2</sub> setpoint. CO<sub>2</sub> setpoint, and minimum DCV fresh air damper position shall be programmable at the human interface, or building management system.

- D. Provide Outside Air Measurement. A factory mounted airflow measurement station (Traq™) shall be provided in the outside air opening to measure airflow. The airflow measurement station shall measure from 40 cfm/ton to maximum airflow. The airflow measurement station shall adjust for temperature variations. Measurement accuracy does not exceed 10% at minimum airflow and decreases to less than 5% at higher airflows, meeting requirements of LEED IE Q Credit 1 as defined by ASHRAE 62.1-2007.
- E. Provide Economizer Control with Reference Enthalpy. Economizer control option shall include an outdoor enthalpy sensor to compare the total heat content of outdoor air to a locally adjustable setpoint. The setpoint shall be programmed at the user interface to determine if the outdoor enthalpy condition is suitable for economizer operation.

#### 2.14 DAMPERS

- A. Provide Low Leak Economizer Dampers. Low leak dampers shall be provided with rolled stainless steel jamb seals to the sides of the damper assembly. Low leak economizer dampers shall have a leakage rate of 10 cfm/sq ft or less tested in accordance with AMCA Standard 500.
- B. Fault Detection and Diagnostic (FDD) control shall also be provided with Low Leak Economizers. FDD control shall monitor the commanded position of the economizer compared to the feedback position of the damper. If the damper position is outside +/- 10% of the commanded position, a diagnostic shall be generate
- C. Provide Ultra Low Leak Economizer Dampers. Economizer return and outside air dampers shall be provided with chlorinated polyvinyl chloride gasketing added to the damper blades and rolled stainless steel jamb seals to the sides of the damper assembly. The economizer shall have a functional life of 60,000 opening and closing cycles. Dampers shall be AMCA 511 Class 1 certified with a maximum leakage rate of 4 cfm/sq-ft at 1.0 inch wg. pressure differential thus meeting requirements of ASHRAE 90.1-2013, California Title 24-2013, and IECC-2012.
- D. Fault Detection and Diagnostic (FDD) control shall also be provided with ultra low leak economizers. FDD control shall monitor the commanded position of the economizer compared to the feedback position of the damper. If the damper position is outside +/- 10% of the commanded position, a diagnostic shall be generated.

#### 2.15 ROOF CURB ADAPTOR

- A. Provide factory supplied roof curb adaptor for connection to existing to remain roof curbs.

- B. Contractor is responsible for final measurements and field verification of dimensions before or after demolition of existing units occur.
- C. Curb Adaptors shall be constructed of heavy gauge zinc coated steel with supply and return air gasketing. Ship knocked down and provide instructions for easy assembly.
- D. Curb shall be manufactured in accordance with the National Roofing Contractors Association guidelines for rooftop equipment support.
- E. Contractor to coordinate condensate drain piping and trap height with the existing to remain roof curb and new adaptors. Contractor shall consult trap height with internal static pressure requirements and verify with roof top manufacturer. Condensate piping shall be routed per the documents to nearest roof drain.

#### 2.16 Controls

- A. The air handling equipment shall be provided with a “NO Controls” package setup. The bidding contractor shall contact the County’s controls contractor, EASI Controls, for design requirements of the referenced units. The units shall not come to suite with any controls equipment. All controls related work, connections and integration shall be completed by EASI Controls. Refer to design documents for controls descriptions, operation strategies and required controls points.
- B. All unit controls shall have compatibility, via BACNET, to the existing building automation system. The controls contractor shall verify and coordinate with the Owner for all requirements before purchase of new units to eliminate any compatibility issues of integration between the new units and existing building interface. Owner will source separate county approved controls contractor to integrate the RTU controls (from on board controller) to the existing BAS system established in the existing buildings. It is the responsibility of the bidding contractor to coordinate and verify the units are fully compatible for building integration.
- C. Provide complete controls for new RTUs. The controller shall be an application-specific, programmable controller that is designed to control packaged HVAC equipment. A 7” user interface features a touch-sensitive color screen that provides facility managers with at-a-glance operating status, performance monitoring, scheduling changes and operating adjustments. Other advanced features include automated controller backup on SD card and optional features such as secure remote connectivity, wireless building communications, mobile device connectivity and custom programming and expandable I/O
- D. Provide Power Meter. Factory installed power meter shall measure unit energy usage to 0.2% accuracy (ANSI C12.20) and communicate through the controller enabling viewing through user interface or building automation system.
- E. Provide Rapid Restart. Option shall provide immediate start up upon power failure. A backup generator shall be required on site before unit start up. Rapid Restart shall begin immediately

after recovery from a power loss and work by restarting the compressors and supply fan quickly to provide full cooling within two to three minutes.

- F. Provide Multi Zone Variable Air Volume (Discharge Air Temperature). Option shall provide all necessary controls to operate a VAV rooftop from the discharge air temperature, including discharge air microprocessor controller and discharge air sensor. The controller shall coordinate the economizer control and the stages of cooling with discharge air temperature reset capabilities. Includes factory installed and tested VFDs to provide supply fan motor speed modulation.
  - G. All communications shall support standard BACnet® communication protocol through a RS485, two-wire communication link or BACnet®/IP.
- 2.17 ADD Alternate #1 – Bi Polar Ionization (Supply Duct Mounted in each supply riser)
- A. Basis of Design is Phenomenal Aire Series “C” Universal (C20).
  - B. Unit shall be direct insertion type and duct mountable.
  - C. Electrical shall be 5 watts at 110 volts, per unit.
  - D. 4 units per RTU. Contractor to verify final selections and model with manufacturer for total airflow.
  - E. Pressure drop shall be minimized and not greater than 0.05” Wg.
  - F. Control head shall be mounted external to supply duct and placed on the discharge supply ductwork prior to any duct split or branch ducts.
  - G. Controls shall coordinate with RTU control panel for airflow verification prior to energizing.
  - H. Capacity shall be a minimum of 190 million ions/cc/sec per inch of insertion tube.
  - I. Provide unit with minimum of 3 year factory warranty.
  - J. Tube shall be made of carbonized resin or carbon fiber.
  - K. Other acceptable manufacturer is Atmos Air.
  - L. Capacity of unit shall be verified with the final purchased maximum airflow of the new units.
  - M. Contractor to provide weatherproof disconnect switch for each system provided for each RTU. Coordination with electrical documents for electrical circuiting.

2.18 ADD Alternate #2 – UV Light Section (Installed in Unit)

- A. Basis of Design is Lumalier model AR95.
- B. Unit shall mounted directly in unit after cooling coil.
- C. Electrical shall be 120 volts.
- D. Confirm final dimensions and bulb number and array with approved roof top manufacturer. For basis of design RTU unit shall be a 2 row 5 bulb array.
- E. Provide and coordinate external junction box with RTU manufacturer and other trades.
- F. Bulbs shall be 95 watts. (Contractor to provide 1 full set of additional bulbs with purchase of new system for each RTU.)
- G. Door switch shall be provided with each unit.
- H. PCO reduction kit shall be provided for each unit.
- I. Light system framing shall be constructed of aluminum.
- J. Bulb life shall be no less than 18 months.
- K. Unit shall be certified by ASHRAE TC 2.09 and EPA EST. No. 91347-TN-001.
- L. Provide unit with minimum of 5 year factory warranty.
- M. Contractor to provide weatherproof disconnect switch for each system provided for each RTU. Coordination with electrical documents for electrical circuiting.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Verify that roof is ready to receive work and opening dimensions are as measured in the field by the mechanical contractor. Before start of demolition of existing unit, contractor to verify the existing to remain roof curb dimensions to ensure the new roof curb adaptor will fit per manufacturer's requirements.
- B. Verify that proper power supply is available.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork. Install roof mounting curb level.
- C. Contractor to verify and coordinate curb adaptor dimensions with existing to remain roof curb on roof prior to installation of new units.

3.3 MANUFACTURER'S FIELD SERVICES

- A. Startup is performed by factory trained and authorized service technicians confirming equipment has been correctly installed and passed specification checklist prior to equipment becoming operational.



# ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

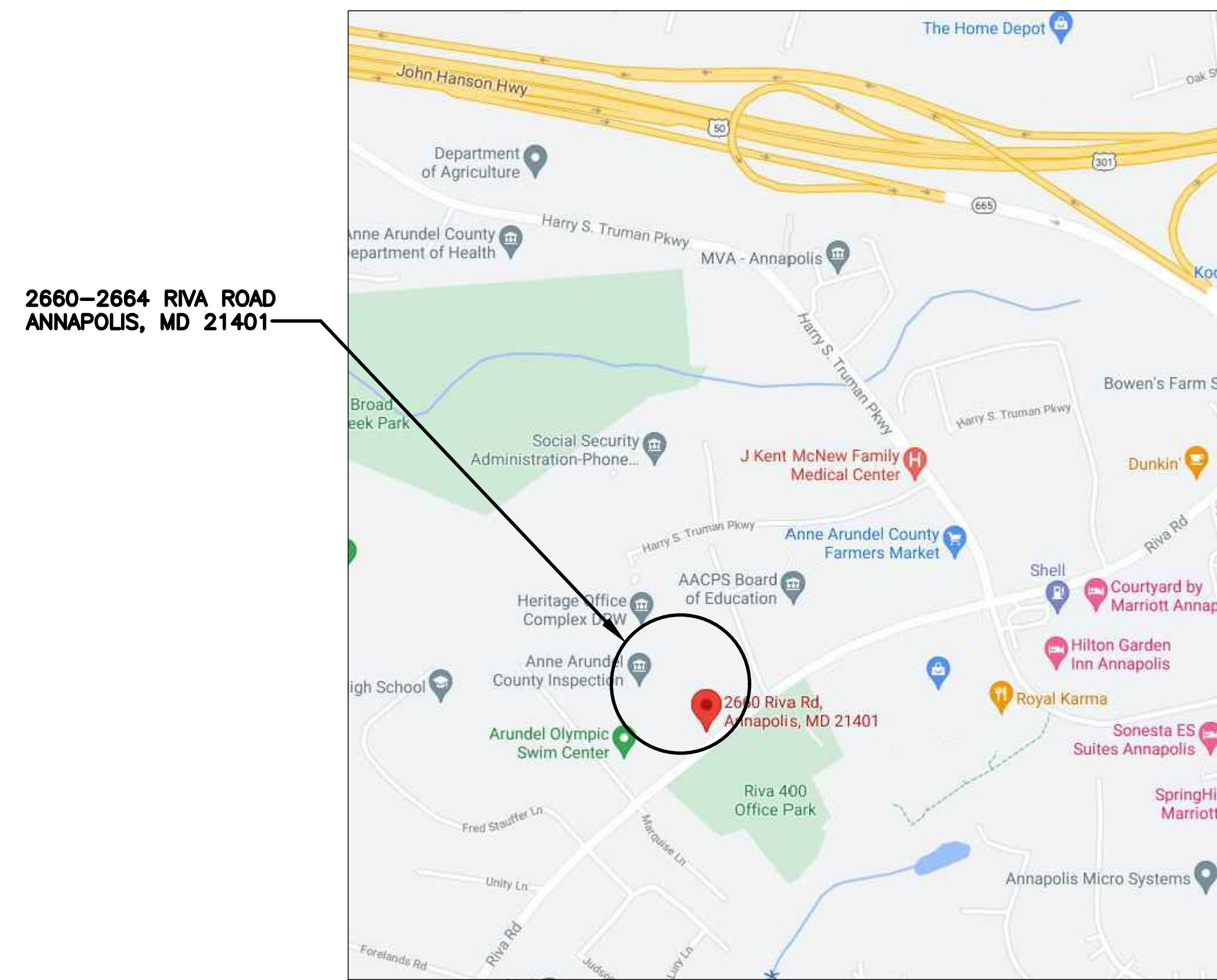
## DEPARTMENT OF PUBLIC WORKS

BUREAU OF ENGINEERING  
2662 RIVA ROAD  
ANNAPLOIS, MD 21401-7374  
(410) 222-7549

# HERITAGE COMPLEX RTU REPLACEMENT

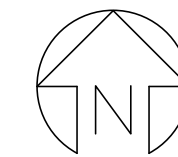
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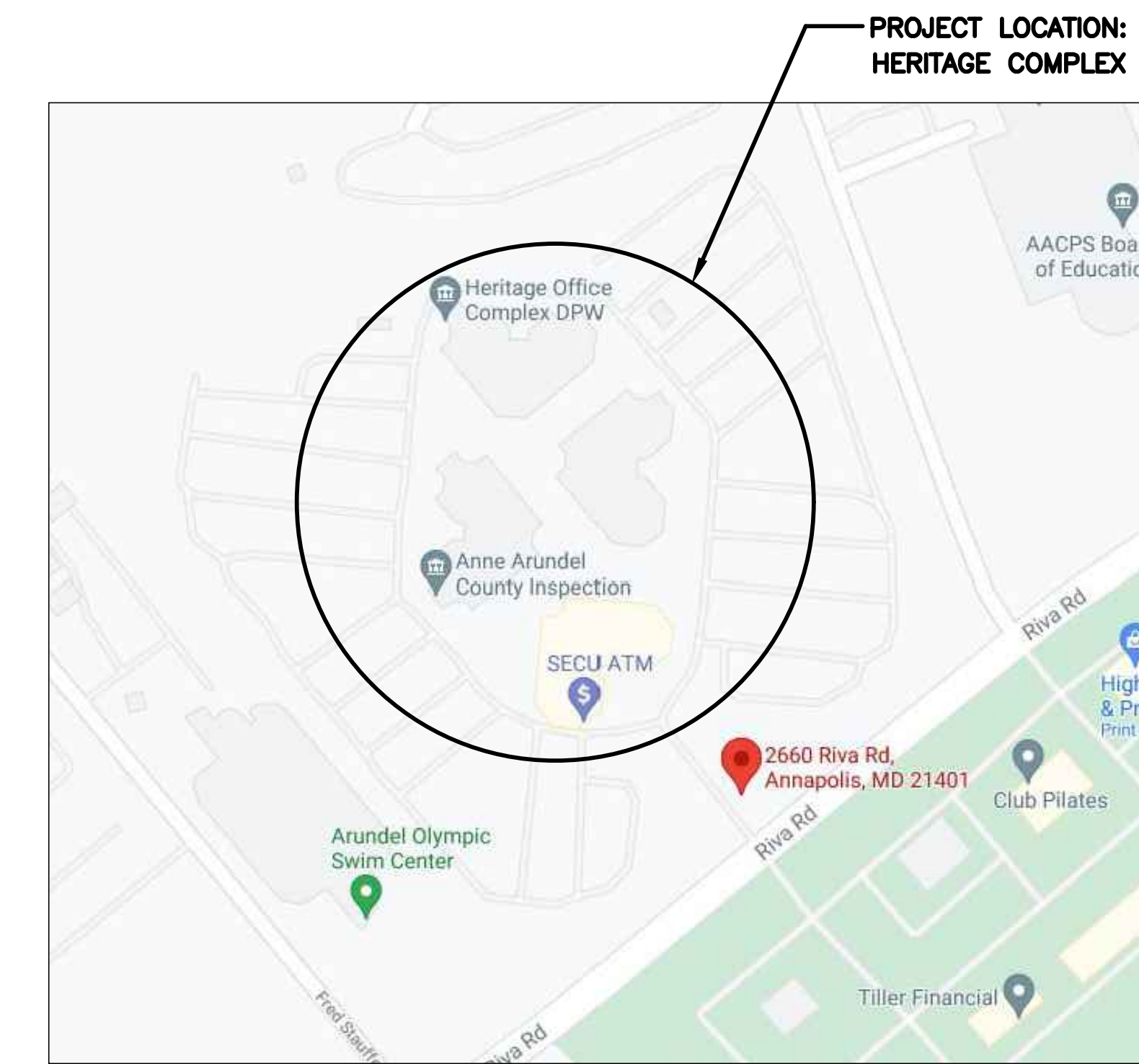


2660-2664 RIVA ROAD  
ANNAPOLIS, MD 21401

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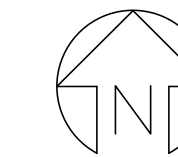


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PROJECT LOCATION:  
HERITAGE COMPLEX

SITE MAP  
SCALE: NONE



PREPARED BY:



RMF ENGINEERING, Inc  
5520 RESEARCH PARK DRIVE SUITE 300  
BALTIMORE, MD 21228

## FINAL SUBMISSION

<p>RMF ENGINEERING, INC 5520 RESEARCH PARK DR, 3RD FLR BALTIMORE, MD 21228 P: 410.576-0505 F: 410.385-0327 RMF Project No. 121004.A0</p> <p>Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License Number: 54343 EXP DATE: 05/14/2025</p>	<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>BY</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>FINAL SUBMISSION</td> <td></td> <td>09-22-2023</td> </tr> <tr> <td></td> <td>RE-BID SUBMISSION</td> <td></td> <td>03-20-2024</td> </tr> </tbody> </table>				NO.	DESCRIPTION	BY	DATE	1	FINAL SUBMISSION		09-22-2023		RE-BID SUBMISSION		03-20-2024	<p>ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS</p> <table border="1"> <thead> <tr> <th>APPROVED</th> <th>DATE</th> <th>APPROVED</th> <th>DATE</th> <th>SCALE:</th> <th>GENERAL ENGINEERING</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td>NTS</td> <td>HERITAGE COMPLEX - RTU REPLACEMENT</td> </tr> <tr> <td>CHIEF ENGINEER</td> <td></td> <td>PROJECT MANAGER</td> <td></td> <td>DRAWN BY</td> <td>MFS</td> </tr> <tr> <td>APPROVED</td> <td></td> <td>APPROVED</td> <td></td> <td>CHECKED BY</td> <td>MFS</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>PROJECT NO.</td> <td>C537800</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>SHEET NO.</td> <td>1 OF 26</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>PROPOSAL NO.</td> <td>C537896</td> </tr> </tbody> </table> <p>TITLE SHEET AND DRAWING INDEX Drawing No.: G000</p>				APPROVED	DATE	APPROVED	DATE	SCALE:	GENERAL ENGINEERING					NTS	HERITAGE COMPLEX - RTU REPLACEMENT	CHIEF ENGINEER		PROJECT MANAGER		DRAWN BY	MFS	APPROVED		APPROVED		CHECKED BY	MFS					PROJECT NO.	C537800					SHEET NO.	1 OF 26					PROPOSAL NO.	C537896
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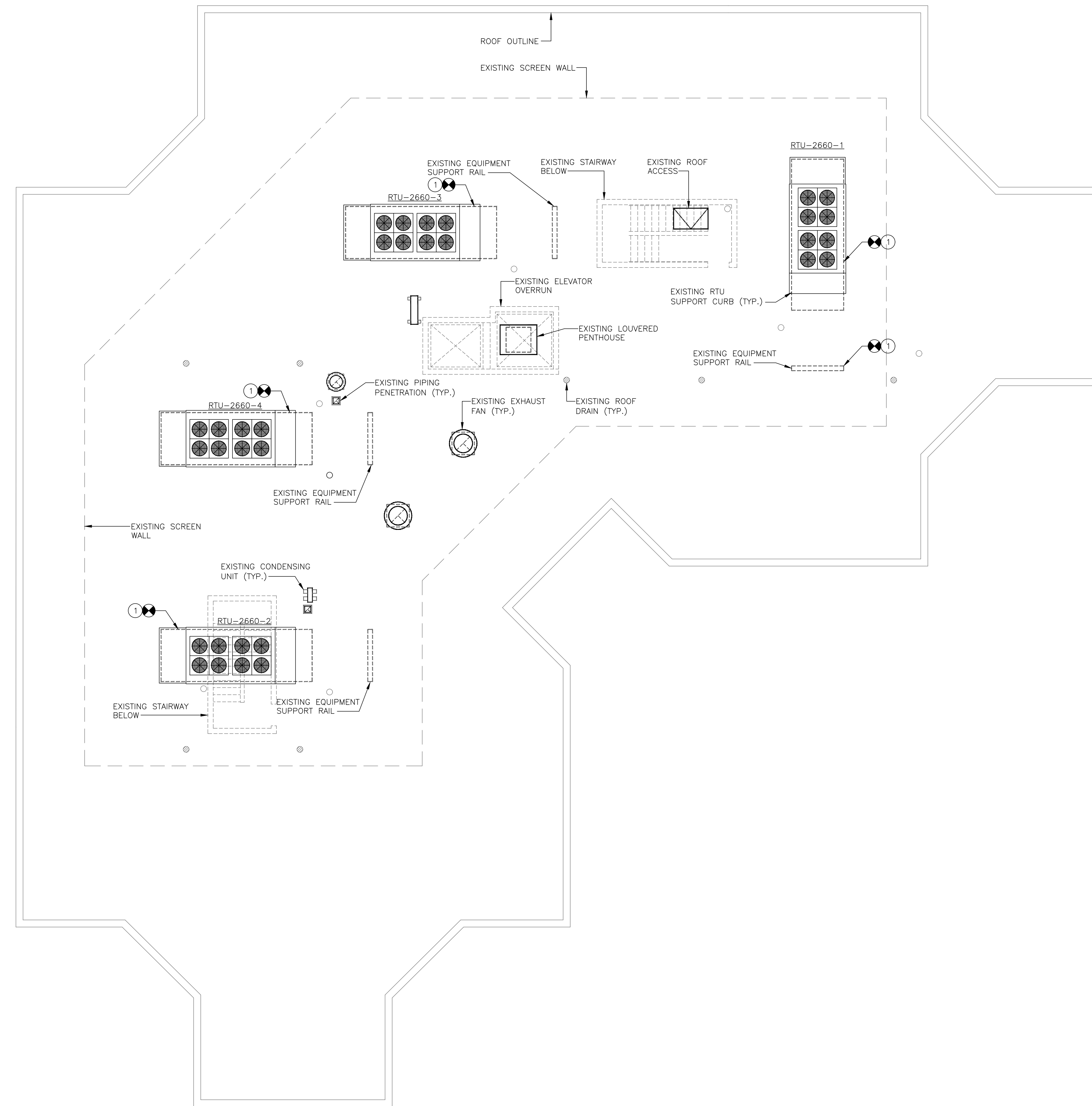


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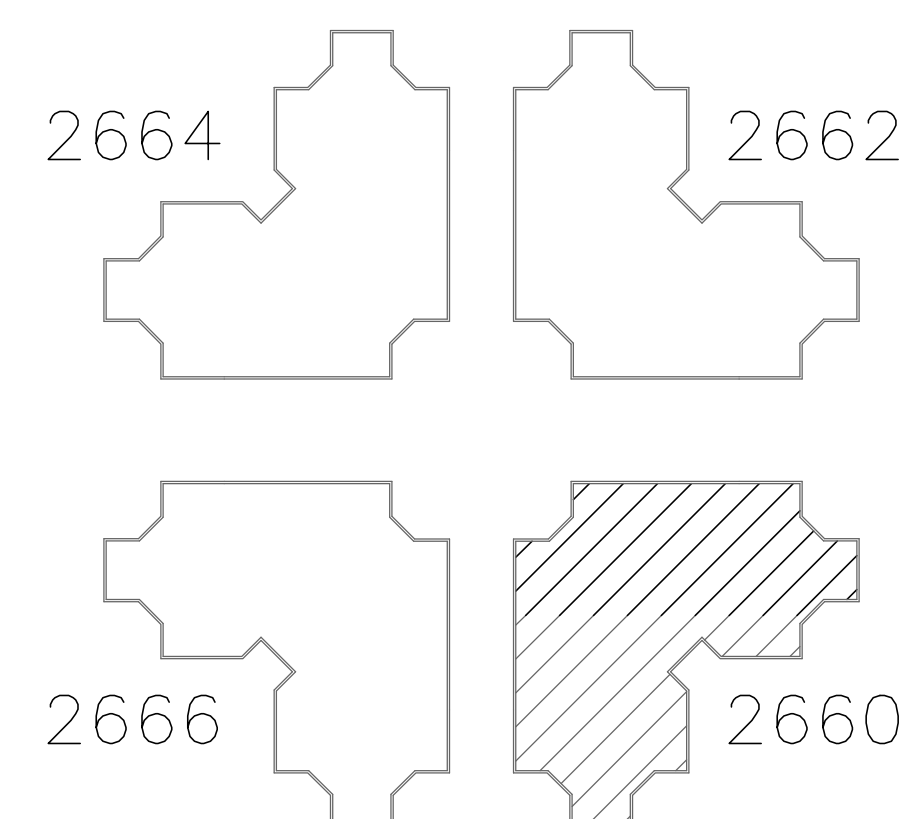
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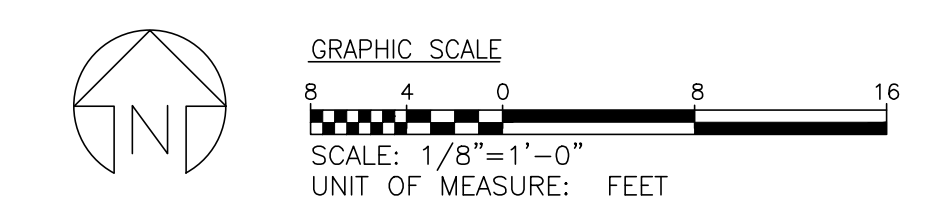
- ① COORDINATE AND ATTACHED NEW RTU CURB ADAPTOR TO EXISTING TO REMAIN ROOF CURB.



**ROOF PLAN BUILDING 2660 – NEW WORK – ADD ALTERNATE 3**



**KEY PLAN:**



**rmf** ENGINEERING, INC.  
 5520 RESEARCH PARK DR, 3RD FLR  
 BALTIMORE, MD 21228  
 P: 410.576-0505 F: 410.385-0327  
 RMF Project No. 121004.A0

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License Number: 54343 EXP. DATE: 05/14/2025

REVISIONS			
NO.	DESCRIPTION	BY	DATE
1	RE-BID SUBMISSION		03-20-2024

**ANNE ARUNDEL COUNTY  
 DEPARTMENT OF PUBLIC WORKS**

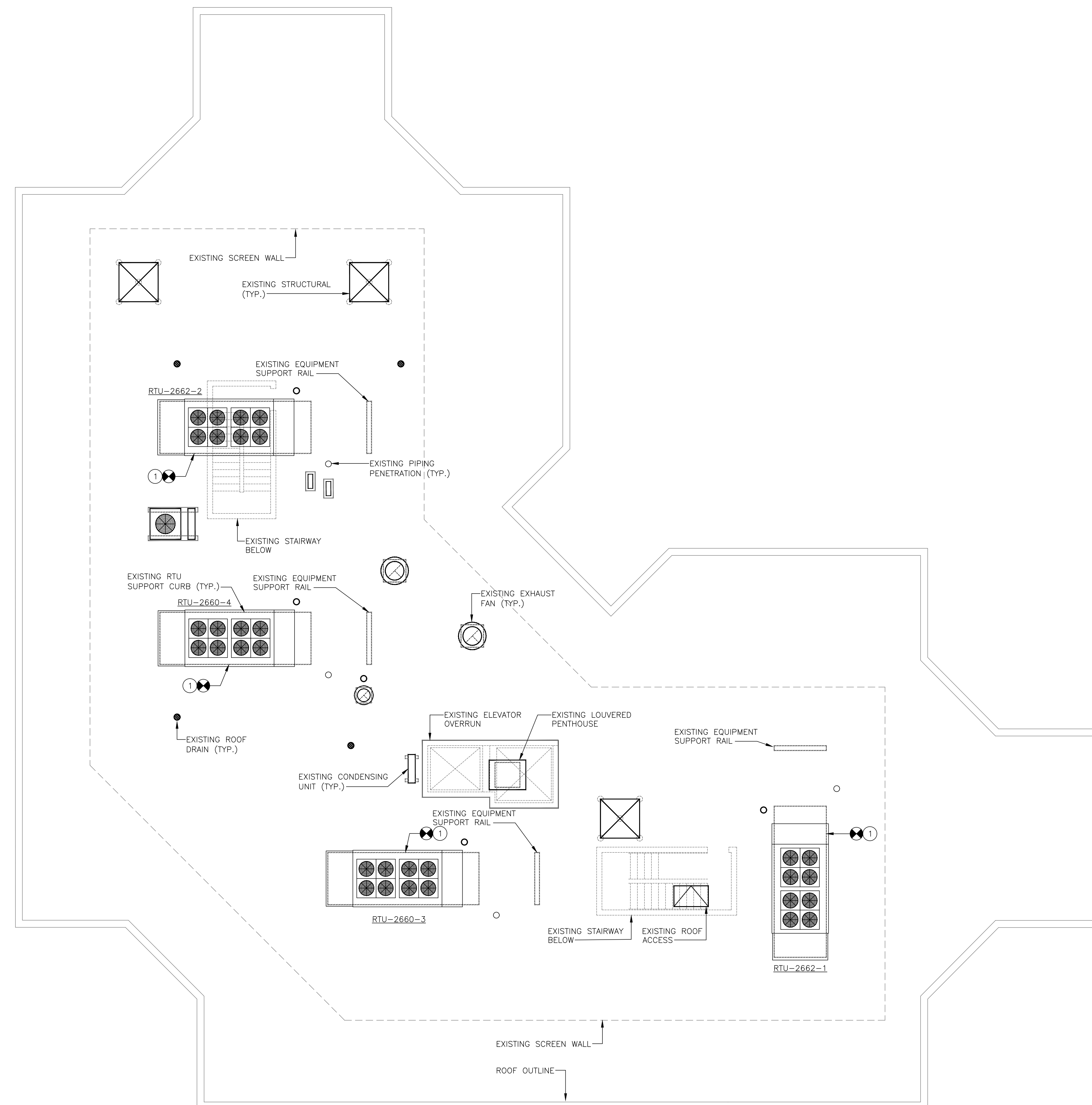
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				PROJECT NO. C537800	ROOF PLAN – NEW WORK
				SHEET NO. 9 OF 26	
				PROPOSAL NO. C537896	Drawing No.: M101A

**GENERAL NOTES:**

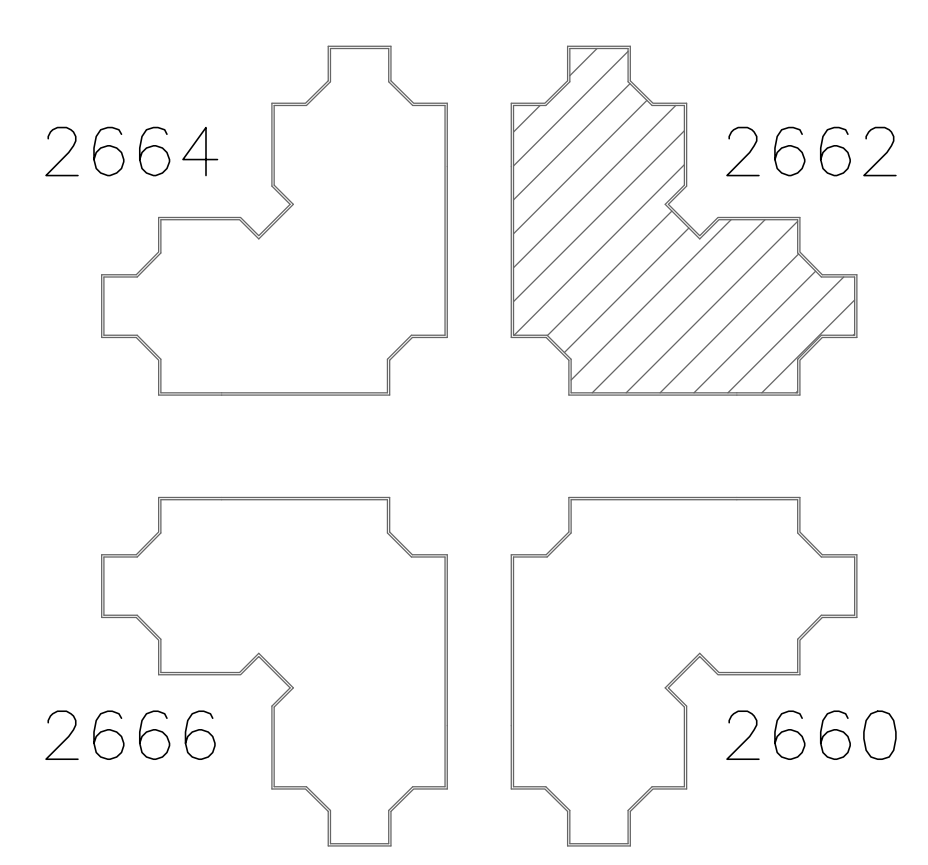
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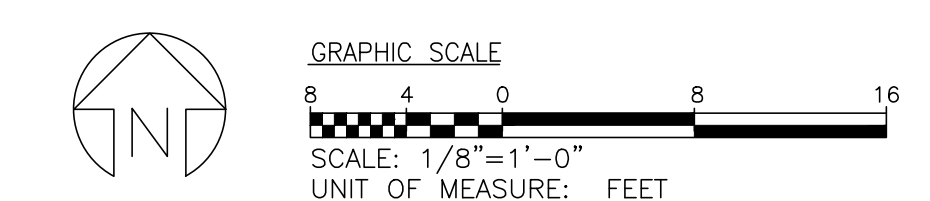
- ① COORDINATE AND ATTACHED NEW RTU CURB ADAPTOR TO EXISTING TO REMAIN ROOF CURB.



ROOF PLAN BUILDING 2662 -- NEW WORK -- ADD ALTERNATE 3



KEY PLAN:



**rmf** RMF ENGINEERING, INC.  
5520 RESEARCH PARK DR. 3RD FLR  
BALTIMORE, MD 21228  
P:410.576-0505 F:410.385-0327  
RMF Project No. 121004.A0

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License Number \_54343\_ EXP DATE \_05/14/2025\_

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1	RE-BID SUBMISSION		03-20-2024

ANNE ARUNDEL COUNTY  
DEPARTMENT OF PUBLIC WORKS

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				DRAWN BY: MFS
				CHECKED BY: SLD
				PROJECT NO. C537800
				SHEET NO. 11 OF 26
				PROPOSAL NO. C537896

GENERAL ENGINEERING  
HERITAGE COMPLEX - RTU REPLACEMENT  
MECHANICAL HVAC BUILDING 2662  
ROOF PLAN - NEW WORK

Drawing No.: **M102A**

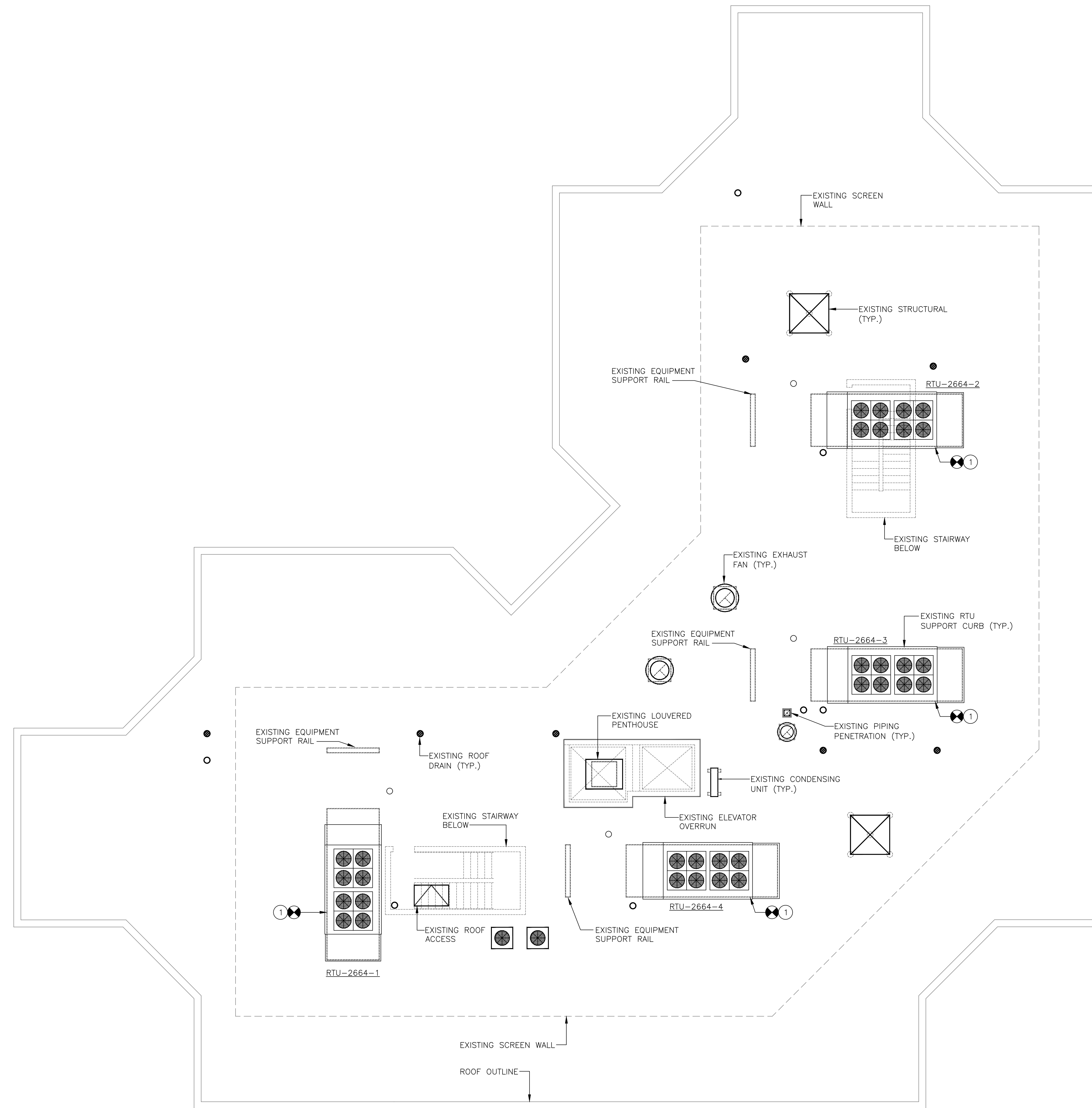


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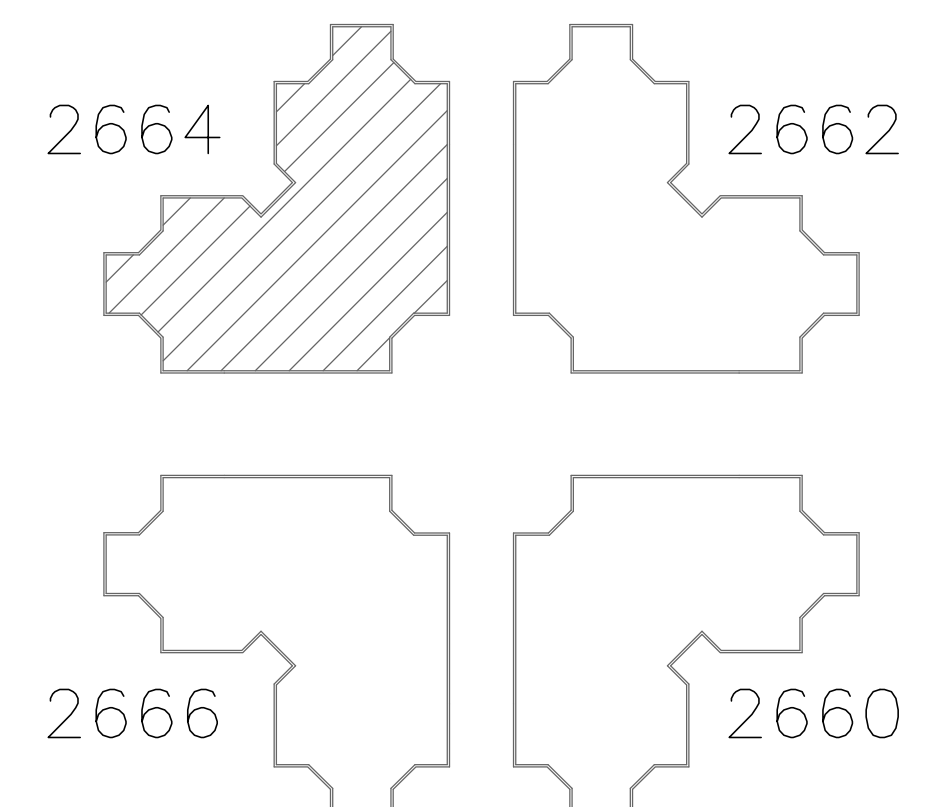
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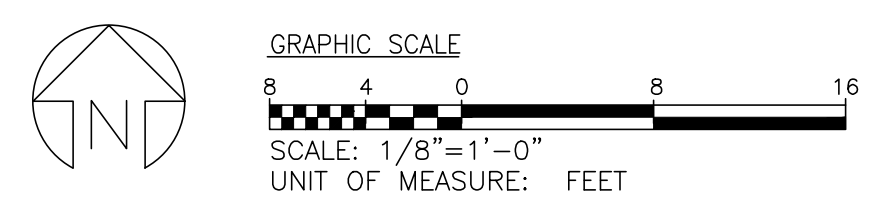
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**ROOF PLAN BUILDING 2664 – NEW WORK – ADD ALTERNATE 3**



**KEY PLAN:**



**rmf** RMF ENGINEERING, INC.  
5520 RESEARCH PARK DR, 3RD FLR  
BALTIMORE, MD 21228  
P: 410.576-0505 F: 410.385-0327  
RMF Project No. 121004.A0

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License Number: 54343 EXP. DATE: 05/14/2025

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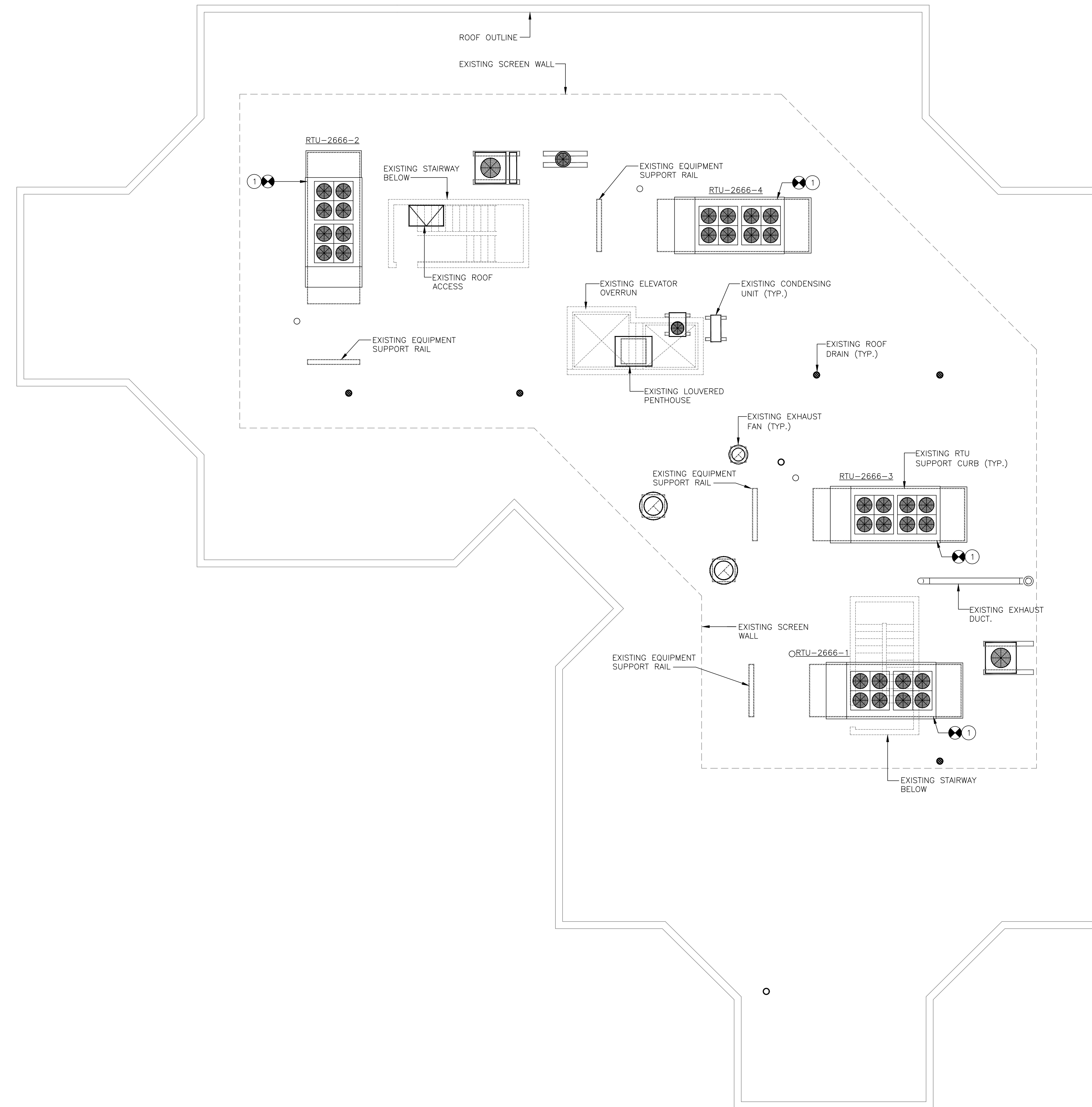
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APPROVED	DATE	APPROVED	DATE
ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES	
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PROJECT NO. C537800		ROOF PLAN – NEW WORK	
SHEET NO. 13 OF 26		PROPOSAL NO. C537896	
DRAWING NO. M103A			

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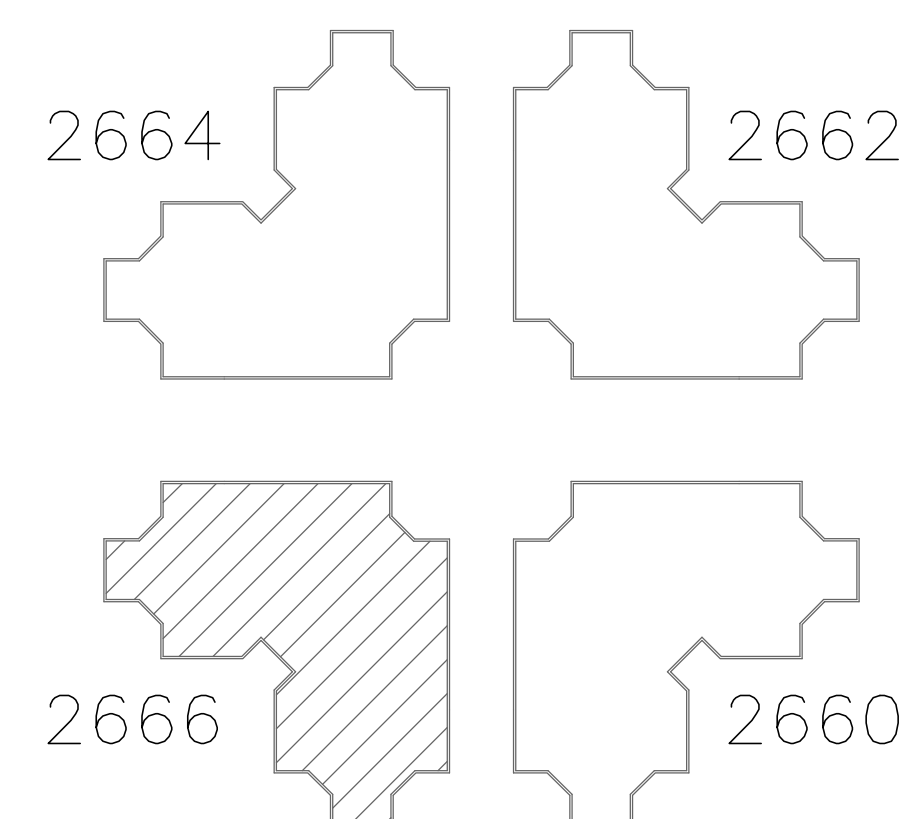
1. NEW RTUS SHALL REUSE EXISTING EQUIPMENT CURBS AND EQUIPMENT RAILS. CONTRACTOR SHALL COORDINATE EXACT LOCATION AND SIZES OF NEW RTU AND ASSOCIATED CURBS BEFORE ORDERING UNITS TO ENSURE WATER AND AIR TIGHT FIT. CURB ADAPTORS ARE REQUIRED FOR NEW RTUS AND SHALL EXTEND TO COVER THE ENTIRE FOOTPRINT OF THE UNIT. EXISTING DUCT SIZES FOR EACH UNIT ARE APPROXIMATELY 46X30 INCHES FOR SUPPLY AND 52X48 FOR RETURN. CONTRACTOR SHALL FIELD VERIFY ALL TRANSITION SIZES REQUIRED FROM NEW RTU OPENINGS TO EXISTING TO REMAIN DUCTWORK. FLEXIBLE CONNECTIONS SHALL BE PROVIDED BETWEEN THE RTU AND THE BUILDING DUCTWORK.
2. CONTRACTOR SHALL INSPECT THE EXISTING FLASHING OF EQUIPMENT CURBS AND RAILS UPON INSTALLATION OF NEW EQUIPMENT.
3. RTU CONDENSATE PIPING SHALL TERMINATE WITHIN 1 FOOT OF NEAREST ROOF DRAIN. DRAIN PIPING SHALL BE HARD PIPED AND SUPPORTED ON ROOF WITH PATE STYLE SUPPORTS. THE ROUTING OF THE PIPING SHALL BE COORDINATED WITH NEW AND OTHER EXISTING TO REMAIN EQUIPMENT.

**DRAWING NOTES:**

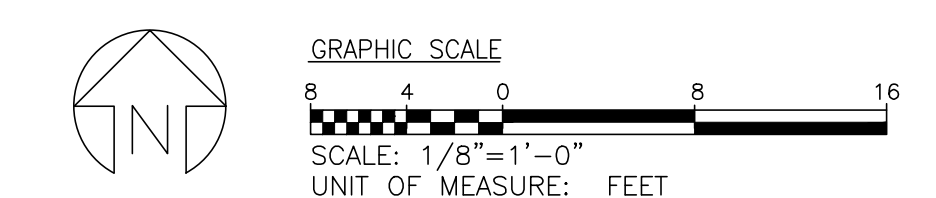
- ① COORDINATE AND ATTACHED NEW RTU CURB ADAPTOR TO EXISTING TO REMAIN ROOF CURB.



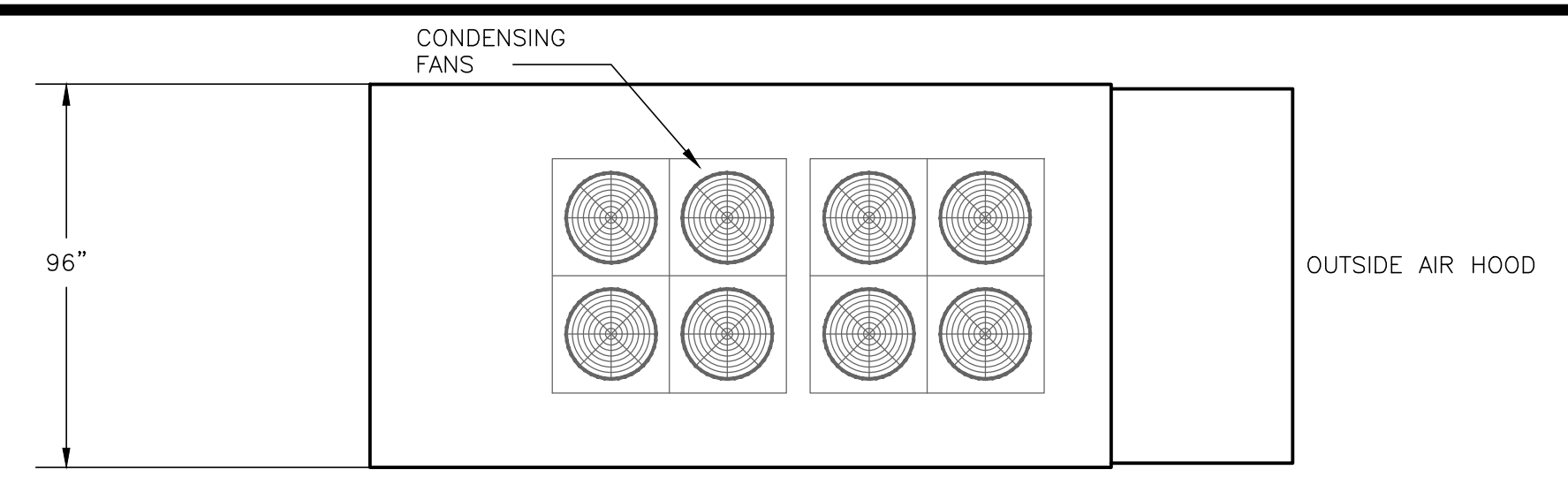
ROOF PLAN BUILDING 2666 -- NEW WORK -- ADD ALTERNATE 3



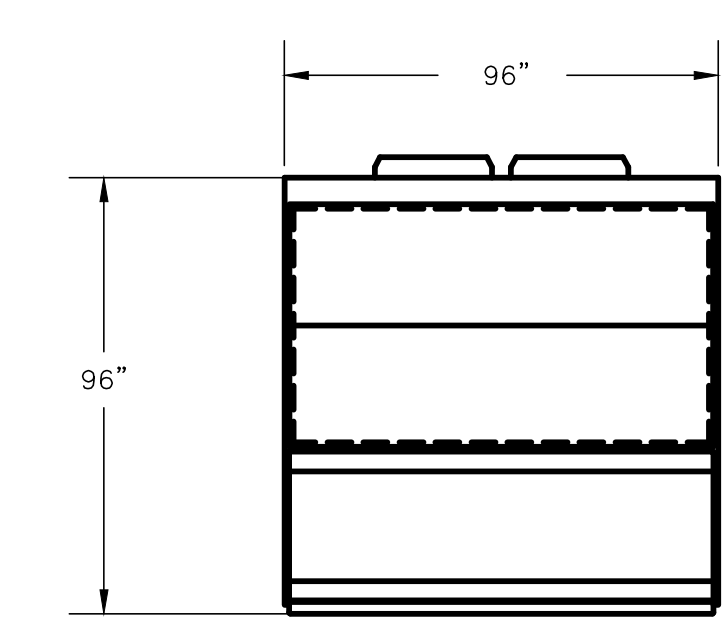
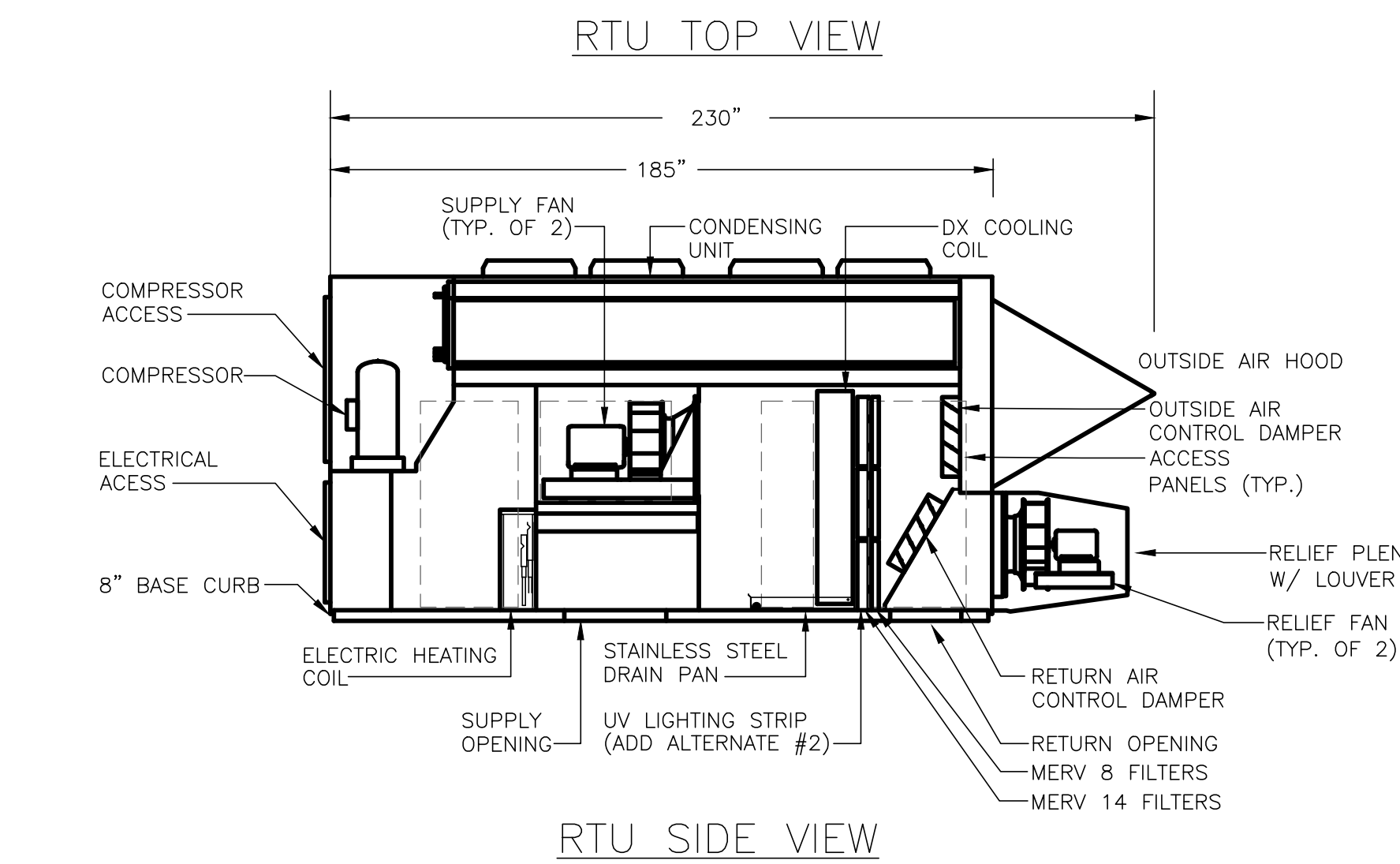
KEY PLAN:



<p>RMF ENGINEERING, INC. 5520 RESEARCH PARK DR, 3RD FLR BALTIMORE, MD 21228 P: 410.576-0505 F: 410.385-0327 RMF Project No. 121004.A0</p> <p>Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License Number: 54343 EXP. DATE: 05/14/2025</p>	<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>BY</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>FINAL SUBMISSION</td> <td></td> <td>09-22-2023</td> </tr> <tr> <td></td> <td>RE-BID SUBMISSION</td> <td></td> <td>03-20-2024</td> </tr> </tbody> </table>				NO.	DESCRIPTION	BY	DATE	1	FINAL SUBMISSION		09-22-2023		RE-BID SUBMISSION		03-20-2024	<p>ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS</p> <p>SCALE: 1/8"=1'-0"</p> <table border="1"> <tr> <td>APPROVED</td> <td>DATE</td> <td>APPROVED</td> <td>DATE</td> </tr> <tr> <td>CHIEF ENGINEER</td> <td></td> <td>PROJECT MANAGER</td> <td></td> </tr> <tr> <td>APPROVED</td> <td></td> <td>APPROVED</td> <td></td> </tr> <tr> <td>ASSISTANT CHIEF ENGINEER</td> <td></td> <td>CHIEF, RIGHT OF WAY SERVICES</td> <td></td> </tr> </table> <p>DRAWN BY: MFS CHECKED BY: SLD PROJECT NO. C537800 SHEET NO. 15 OF 26 PROPOSAL NO. C537896</p> <p>HERITAGE COMPLEX - RTU REPLACEMENT MECHANICAL HVAC BUILDING 2666 ROOF PLAN - NEW WORK</p> <p>Drawing No.: M104A</p>				APPROVED	DATE	APPROVED	DATE	CHIEF ENGINEER		PROJECT MANAGER		APPROVED		APPROVED		ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES	
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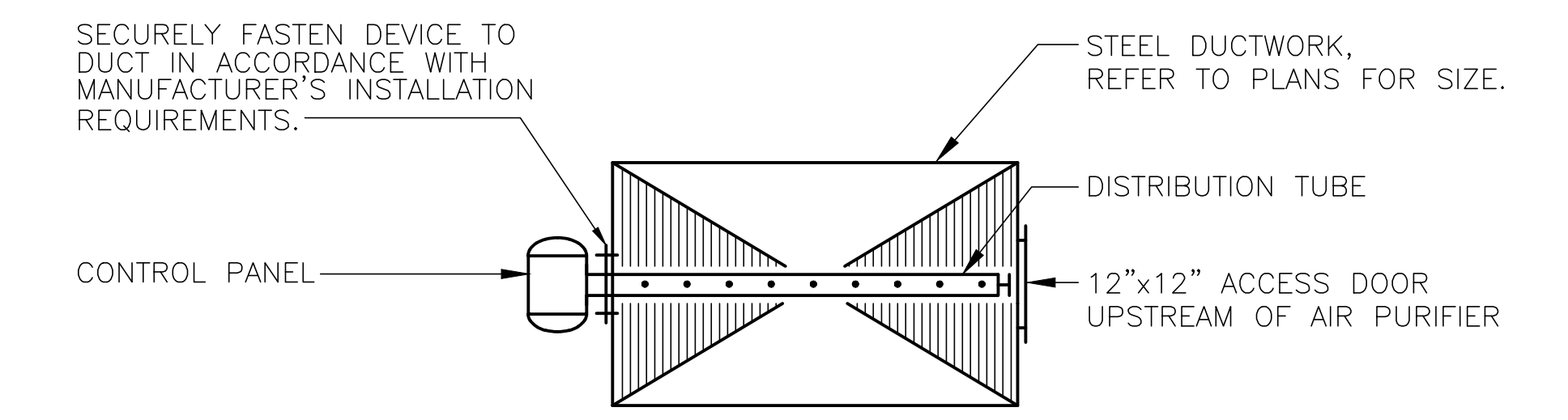


- NOTES:**
1. ALL DEBRIS FROM EXISTING ROOF CURB SHALL BE REMOVED BEFORE INSTALLATION ON NEW CURB ADAPTOR AND RTU.
  2. EXISTING SMOKE DAMPER SHALL BE REUSED AND RECONNECTED AS FIELD CONDITIONS ALLOW. CONTROLS OF SMOKE DAMPER SHALL BE INTEGRATED BACK INTO NEW RTU.
  3. ALL NEW DUCT CONNECTIONS FROM RTU TO EXISTING DUCT RISERS SHALL BE INSULATED WITH MINIMUM 1 INCH THICK CLOSED CELL INSULATION.
  4. CONTRACTOR TO VERIFY ALL EXISTING RTU CURB DIMENSIONS BEFORE PURCHASE AND INSTALL OF NEW CURB ADAPTOR. NEW CURB ADAPTOR SHALL BE FULLY COORDINATED WITH MANUFACTURER AND NEW RTU DIMENSIONS.



**DETAIL – TYPICAL ROOF TOP UNIT (ADD ALTERNATE 3)**

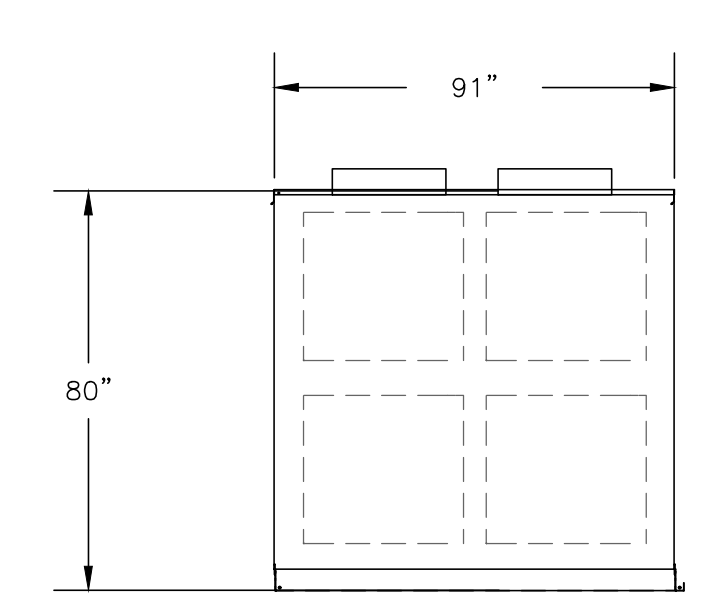
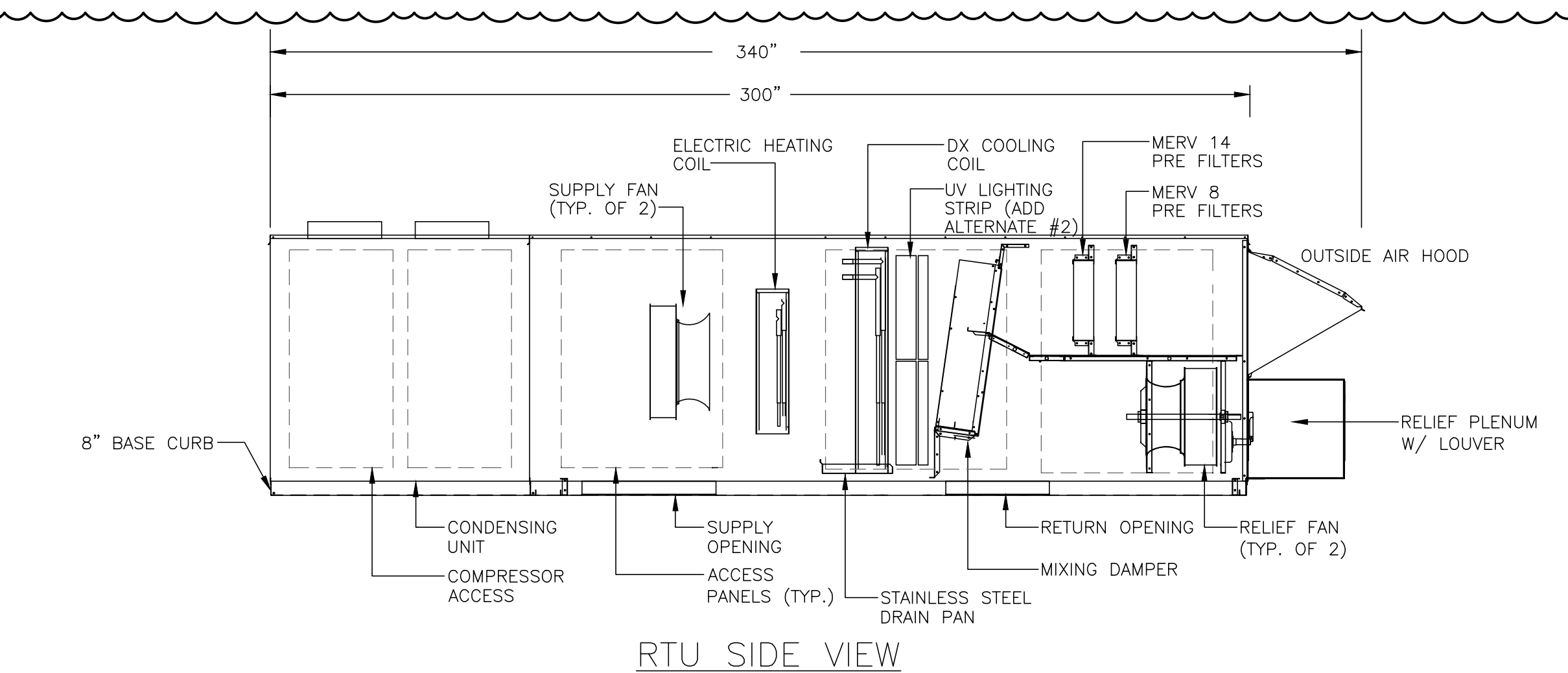
SCALE: NONE 1



- NOTES:**
1. INSTALL MULTIPLE UNITS PER MANUFACTURER RECOMMENDATIONS AND REQUIREMENTS. UNIT SHALL BE ACCESSIBLE VIA ACCESS PANEL IN DUCT. UNIT SHALL BE INSTALLED UPSTREAM OF ALL BRANCH DUCT CONNECTIONS AND LOCATED IN THE RISER DUCT.
  2. COORDINATE POWER REQUIREMENTS WITH ELECTRICAL DRAWINGS.
  3. SUBMITTED AND INSTALLED UNIT SHALL BE UL LISTED AND ENERGY STAR CERTIFIED.
  4. CONTROLS FOR DEVICE SHALL BE INTERLOCKED WITH AIR FLOW SWITCH LOCATED IN RTU. REFER TO CONTROLS AND SPECIFICATIONS FOR MORE DETAILS.

**DETAIL – BIPOLAR IONIZATION TUBE (DUCT MOUNTED) ADD ALTERNATE #1**

SCALE: NONE 3



- NOTES:**
1. ALL DEBRIS FROM EXISTING ROOF CURB SHALL BE REMOVED BEFORE INSTALLATION ON NEW CURB ADAPTOR AND RTU.
  2. EXISTING SMOKE DAMPER SHALL BE REUSED AND RECONNECTED AS FIELD CONDITIONS ALLOW. CONTROLS OF SMOKE DAMPER SHALL BE INTEGRATED BACK INTO NEW RTU.
  3. ALL NEW DUCT CONNECTIONS FROM RTU TO EXISTING DUCT RISERS SHALL BE INSULATED WITH MINIMUM 1 INCH THICK CLOSED CELL INSULATION.
  4. CONTRACTOR TO VERIFY ALL EXISTING RTU CURB DIMENSIONS BEFORE PURCHASE AND INSTALL OF NEW CURB ADAPTOR. NEW CURB ADAPTOR SHALL BE FULLY COORDINATED WITH MANUFACTURER AND NEW RTU DIMENSIONS.

**DETAIL – TYPICAL ROOF TOP UNIT (BASE BID)**

SCALE: NONE 2

**BIPOLAR IONIZATION (ALTERNATE 1)**

DESIGNATION :	AFD-2660-1 THRU 4, AFD-2662-1 THRU 4, AFD-2664-1 THRU 4, AFD-2666-1 THRU 4
SERVICE :	RTU SUPPLY AIR DUCT
TOTAL SYSTEM CAPACITY (FLOW):	16,500
TUBE LENGTH:	9 INCH (EACH)
TUBE (BLADE) QUANTITY:	FOUR (PER RTU)
MATERIAL:	CARBON FIBER
MAX. AIR PRESSURE DROP:	.05 INCH
VOLTAGE:	120 V
CONSUMPTION:	5 WATTS (EACH)
FLA:	0.1 AMPS (EACH)
BASIS OF DESIGN :	PHENOMENAL AIRE SERIES C (C20)
REMARKS :	UNIT SHALL BE PROVIDED WITH INTEGRAL CONTROL PANEL, DIRECT SUPPLY DUCT MOUNTED. PROVIDE 4 BLADES/UNITS PER RTU. PROVIDE WEATHER PROOF DISCONNECT PER RTU. UNITS SHALL BE UL LISTED AND ZERO EMISSIONS.

**UV AIR DISINFECTION (ALTERNATE 2)**

DESIGNATION :	AFD-2660-1 THRU 4, AFD-2662-1 THRU 4, AFD-2664-1 THRU 4, AFD-2666-1 THRU 4
SERVICE :	RTU'S
CAPACITY (FLOW):	16,500
LIGHT QUANTITY:	10 (PER RTU)
TUBE LENGTH:	18 INCH
VOLTAGE:	120V
WATTS:	95 W (PER LIGHT)
FRAME MATERIAL:	ALUMINUM
SIZE:	74' x 80'
WEIGHT:	40 LBS
BASIS OF DESIGN :	LUMALIER AR95
REMARKS :	PRE COIL IN UNIT MOUNTED. UNITS SHALL BE CIRCUITED INDEPENDENT OF RTU. PROVIDE WEATHER PROOF DISCONNECT PER RTU. VERIFY LIGHT INSTALLATION AND MOUNTING WITH MANUFACTURER.

**AIR HANDLING UNIT SCHEDULE (BASE BID)**

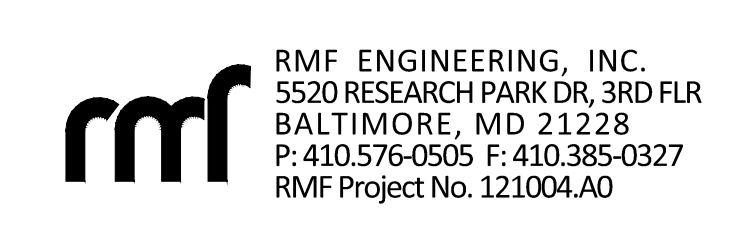
DESIGNATION	LOCATION	UNIT CFM	UNIT TONS	MIN. OA CFM	SUPPLY FAN SECTION				EXHAUST FAN SECTION				COOLING COIL DATA						HEATING SECTION				ELECTRICAL V/ø/Hz	BASIS OF DESIGN	REMARKS												
					CFM	TSP INCH H <sub>2</sub> O	ESP INCH H <sub>2</sub> O	NUMBER OF FANS	MOTOR BHP	HP	RPM	CFM	TSP INCH H <sub>2</sub> O	NUMBER OF FANS	MOTOR BHP	HP	RPM	EAT °F	LAT °F	TOTAL MBH	SENS MBH	MAXIMUM FACE VEL FPM				No OF COILS	ROWS	MAXIMUM AIR PD IN H <sub>2</sub> O	CAPACITY (KW)	EAT °F	LAT °F	TOTAL OUTPUT (MBH)	MAXIMUM AIR PD IN H <sub>2</sub> O	MOP	MCA		
RTU-2660-1 THRU 4	ROOF BLDG 2660	16500	50	4200	8250	6.5	3.0	2	11.6	2@20	2100	7750	1.5	2	3.8	2@7.5	1900	80	67	55	54	595	444	475	1	4	0.75	90	52.5	70	310	0.4	200	185	460/3/60	TRANE	VFD, 18" CURB ADAPTOR
RTU-2662-1 THRU 4	ROOF BLDG 2662	16500	50	4200	8250	6.5	3.0	2	11.6	2@20	2100	7750	1.5	2	3.8	2@7.5	1900	80	67	55	54	595	444	475	1	4	0.75	90	52.5	70	310	0.4	200	185	460/3/60	TRANE	VFD, 18" CURB ADAPTOR
RTU-2664-1 THRU 4	ROOF BLDG 2664	16500	50	4200	8250	6.5	3.0	2	11.6	2@20	2100	7750	1.5	2	3.8	2@7.5	1900	80	67	55	54	595	444	475	1	4	0.75	90	52.5	70	310	0.4	200	185	460/3/60	TRANE	VFD, 18" CURB ADAPTOR
RTU-2666-1 THRU 4	ROOF BLDG 2666	16500	50	4200	8250	6.5	3.0	2	11.6	2@20	2100	7750	1.5	2	3.8	2@7.5	1900	80	67	55	54	595	444	475	1	4	0.75	90	52.5	70	310	0.4	200	185	460/3/60	TRANE	VFD, 18" CURB ADAPTOR

NOTES: UNITS SHALL BE PROVIDED WITH EQUIPMENT CURB ADAPTOR TO FIT ON EXISTING ROOF CURB. UNIT SHALL BE PROVIDED WITH INTERNAL VFDS AND SINGLE POINT ELECTRICAL CONNECTION. UNITS SHALL BE PROVIDED WITH MERV 8 PRE FILTERS AND MERV 14 FINAL FILTERS. UNIT SHALL BE EQUIPPED WITH ECONOMIZER CONTROLS. IF ADD ALTERNATE #2 IS ACCEPTED PROVIDE UV LIGHT SATURATION SECTION FOR AIR AND COIL DISINFECTION.

**AIR HANDLING UNIT SCHEDULE (ADD ALTERNATE 3)**

DESIGNATION	LOCATION	UNIT CFM	UNIT TONS	MIN. OA CFM	SUPPLY FAN SECTION				EXHAUST FAN SECTION				COOLING COIL DATA						HEATING SECTION				ELECTRICAL V/ø/Hz	BASIS OF DESIGN	REMARKS												
					CFM	TSP INCH H <sub>2</sub> O	ESP INCH H <sub>2</sub> O	NUMBER OF FANS	MOTOR BHP	HP	RPM	CFM	TSP INCH H <sub>2</sub> O	NUMBER OF FANS	MOTOR BHP	HP	RPM	EAT °F	LAT °F	TOTAL MBH	SENS MBH	MAXIMUM FACE VEL FPM				No OF COILS	ROWS	MAXIMUM AIR PD IN H <sub>2</sub> O	CAPACITY (KW)	EAT °F	LAT °F	TOTAL OUTPUT (MBH)	MAXIMUM AIR PD IN H <sub>2</sub> O	MOP	MCA		
RTU-2660-1 THRU 4	ROOF BLDG 2660	16500	50	4200	8250	7.9	4.0	2	14.6	2@15	2336	8400	1.5	2	0.56	2@5	1900	80	67	55	54	725	595	475	1	4	0.75	90	52.5	70	310	0.4	200	179	460/3/60	TRANE	VFD, 18" CURB ADAPTOR
RTU-2662-1 THRU 4	ROOF BLDG 2662	16500	50	4200	8250	7.9	4.0	2	14.6	2@15	2336	8400	1.5	2	0.56	2@5	1900	80	67	55	54	725	595	475	1	4	0.75	90	52.5	70	310	0.4	200	179	460/3/60	TRANE	VFD, 18" CURB ADAPTOR
RTU-2664-1 THRU 4	ROOF BLDG 2664	16500	50	4200	8250	7.9	4.0	2	14.6	2@15	2336	8400	1.5	2	0.56	2@5	1900	80	67	55	54	725	595	475	1	4	0.75	90	52.5	70	310	0.4	200	179	460/3/60	TRANE	VFD, 18" CURB ADAPTOR
RTU-2666-1 THRU 4	ROOF BLDG 2666	16500	50	4200	8250	7.9	4.0	2	14.6	2@15	2336	8400	1.5	2	0.56	2@5	1900	80	67	55	54	725	595	475	1	4	0.75	90	52.5	70	310	0.4	200	179	460/3/60	TRANE	VFD, 18" CURB ADAPTOR

NOTES: UNITS SHALL BE PROVIDED WITH EQUIPMENT CURB ADAPTOR TO FIT ON EXISTING ROOF CURB. UNIT SHALL BE PROVIDED WITH INTERNAL VFDS AND SINGLE POINT ELECTRICAL CONNECTION. UNITS SHALL BE PROVIDED WITH MERV 8 PRE FILTERS AND MERV 14 FINAL FILTERS. UNIT SHALL BE EQUIPPED WITH ECONOMIZER CONTROLS. IF ADD ALTERNATE #2 IS ACCEPTED PROVIDE UV LIGHT SATURATION SECTION FOR AIR AND COIL DISINFECTION. UNITS SHALL BE PROVIDED WITH A "NO CONTROLS" PACKAGE. ALL CONTROLS ARE REQUIRED AND SHALL MET THE REQUIREMENTS ON THE CONTROLS DRAWINGS. CONTROLS SHALL BE PROVIDED BY THE THE COUNTYS CURRENT ON CALL CONTRACTOR, EASI CONTROLS.



Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License Number: 54343, EXP. DATE: 05/14/2025.

**REVISIONS**

NO.	DESCRIPTION	BY	DATE
1	FINAL SUBMISSION		09-22-2023
	RE-BID SUBMISSION		03-20-2024

**ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS**

APPROVED	DATE	APPROVED	DATE	SCALE: NTS	GENERAL ENGINEERING
CHEF ENGINEER		PROJECT MANAGER		DRAWN BY: MFS	HERITAGE COMPLEX – RTU REPLACEMENT
APPROVED		APPROVED		CHECKED BY: MES	MECHANICAL DETAILS AND SCHEDULES
				PROJECT NO. C537800	
				SHEET NO. 16 OF 26	
				PROPOSAL NO. C537896	Drawing No.: M500

CONTROL SCHEMATIC

GENERAL:

RTU SHALL BE ENERGIZED THROUGH THE EXISTING BAS OR LOCAL CONTROLLER. THE INTEGRAL CONTROL PANEL (ICP) FOR THE UNIT SHALL MAINTAIN THE DISCHARGE SET POINT OF THE UNIT AT 55F. THE BAS SHALL MODULATE DIRECTLY OR THROUGH THE ICP THE VARIABLE FREQUENCY DRIVE (VFD) AS REQUIRED. TEMPERATURE TRANSMITTER TT-1 SHALL REPORT TO THE BAS THE UNIT'S DISCHARGE TEMPERATURE. THE UNITS AIRFLOW MONITORING SYSTEM, TAMS-1, SHALL VERIFY AIRFLOW AND INTERLOCK WITH THE UNITS OA DAMPER TO MAINTAIN MINIMUM VENTILATION AIR TO THE BUILDING.

COOLING: RTU IS AN DX (HEAT PUMP) SYSTEM WITH STAGES OF COOLING AND AN AUXILIARY ELECTRICAL HEATING COIL TO MAINTAIN A 55F DISCHARGE TEMPERATURE, WHICH SHALL BE CONTROLLED THROUGH THE INTEGRAL CONTROL PANEL OR BAS. THE COOLING MODE WILL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE RISES ABOVE THE OUTSIDE AIR COOLING SETPOINT. DURING THE COOLING MODE, THE DDC CONTROLLER WILL MODULATE THE DIGITAL COMPRESSOR AND/OR STAGE FIXED COMPRESSOR COOLING TO MAINTAIN THE SUPPLY AIR COOLING SETPOINT. THE COOLING MODE WILL REMAIN ACTIVE UNTIL THE OUTSIDE AIR TEMPERATURE FALLS BELOW THE OUTSIDE AIR COOLING SETPOINT. COOLING STAGES ARE MAINTAINED BY ADJUSTABLE MINIMUM ON, OFF, STAGE UP AND STAGE DOWN TIMERS.

HEATING: RTU HAS AN HEAT PUMP HEATING SYSTEM ALONG WITH AN AUXILIARY ELECTRIC HEATING COIL FOR LOW OUTDOOR AIR TEMPERATURE OPERATION. THE INTEGRAL CONTROL PANELS SHALL MODULATE THE COMPRESSORS FOR HEAT PUMP OPERATION OR ELECTRICAL HEATING COIL OPERATION (OR BOTH) IN ORDER TO MAINTAIN THE DISCHARGE SET POINT AT 55F AT ALL TIMES. THE HEATING MODE WILL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE FALLS BELOW THE OUTSIDE AIR HEATING SETPOINT AND THE UNIT IS NOT IN THE DEHUMIDIFICATION MODE. DURING THE HEATING MODE, THE DDC CONTROLLER WILL MODULATE THE COMPRESSOR OR ELECTRIC HEATING COIL TO MAINTAIN THE SUPPLY AIR HEATING SETPOINT. THE HEATING MODE WILL REMAIN ACTIVE UNTIL THE OUTSIDE AIR TEMPERATURE RISES ABOVE THE OUTSIDE AIR HEATING SETPOINT. HEATING IS MAINTAINED BY ADJUSTABLE MINIMUM ON, OFF, STAGE UP AND STAGE DOWN TIMERS.

DEHUMIDIFICATION MODE: THE DEHUMIDIFICATION MODE WILL BE ENABLED ANYTIME THE OUTSIDE AIR DEWPOINT RISES ABOVE THE SUPPLY AIR DEWPOINT SETPOINT. DURING THE DEHUMIDIFICATION MODE, THE DDC CONTROLLER WILL MODULATE AND/OR STAGE COOLING TO MAINTAIN THE SUPPLY AIR DEWPOINT SETPOINT. THE DEHUMIDIFICATION MODE WILL REMAIN ACTIVE UNTIL THE OUTSIDE AIR DEWPOINT FALLS BELOW THE SUPPLY AIR DEWPOINT SETPOINT. REHEAT WILL BE THROUGH THE AUXILIARY ELECTRIC HEATING COIL TO MAINTAIN THE SUPPLY AIR COOLING SETPOINT MINUS 1°F.

SUPPLY FANS: SUPPLY FANS SHALL BE ENERGIZED DURING OCCUPIED MODE. DURING OCCUPIED MODE THE SUPPLY FANS SHALL RUN TO MAINTAIN THE EXISTING BUILDING STATIC PRESSURE SENSOR FOR THE EXISTING VAV SYSTEM. DURING UNOCCUPIED MODE THE SUPPLY FAN SHALL MODULATE TO PROVIDE A MINIMUM OF 50% AIRFLOW.

ADD ALTERNATE #1  
BI POLAR IONIZATION (AFD-1): IONIZATION SYSTEM SHALL ENERGIZE UPON PROVEN AIRFLOW BY TAMS-1. THE UNITS INTEGRAL CONTROL PANEL SHALL BE CONNECTED INTO THE BUILDINGS BAS FOR MONITORING. UNIT SHALL BE ALARMABLE TO THE BAS.

ADD ALTERNATE #2  
ULTRA VIOLET (UV) LIGHT SATURATION SECTION TO BE PROVIDED UPON APPROVAL. UV LIGHT SECTION SHALL BE ENERGIZED AND REMAIN ENERGIZED DURING RTU OPERATION. UV UNIT SHALL BE DE-ENERGIZED WHEN UNIT POWER IS OFF. UV LIGHT SHALL BE ALARMABLE, SIGNAL SHALL BE SENT TO EXISTING BAS SYSTEM UPON FAILURE.

ECONOMIZER CYCLE: DAMPERS D-1, D-2, AND D-3 SHALL MODULATE TO MAINTAIN THE LOWEST ENTERING ENTHALPY DURING THE SUMMER MONTHS AND NO LOWER THAN 45F ENTERING TEMP DURING THE WINTER MONTHS AS INDICATED BY T-4.

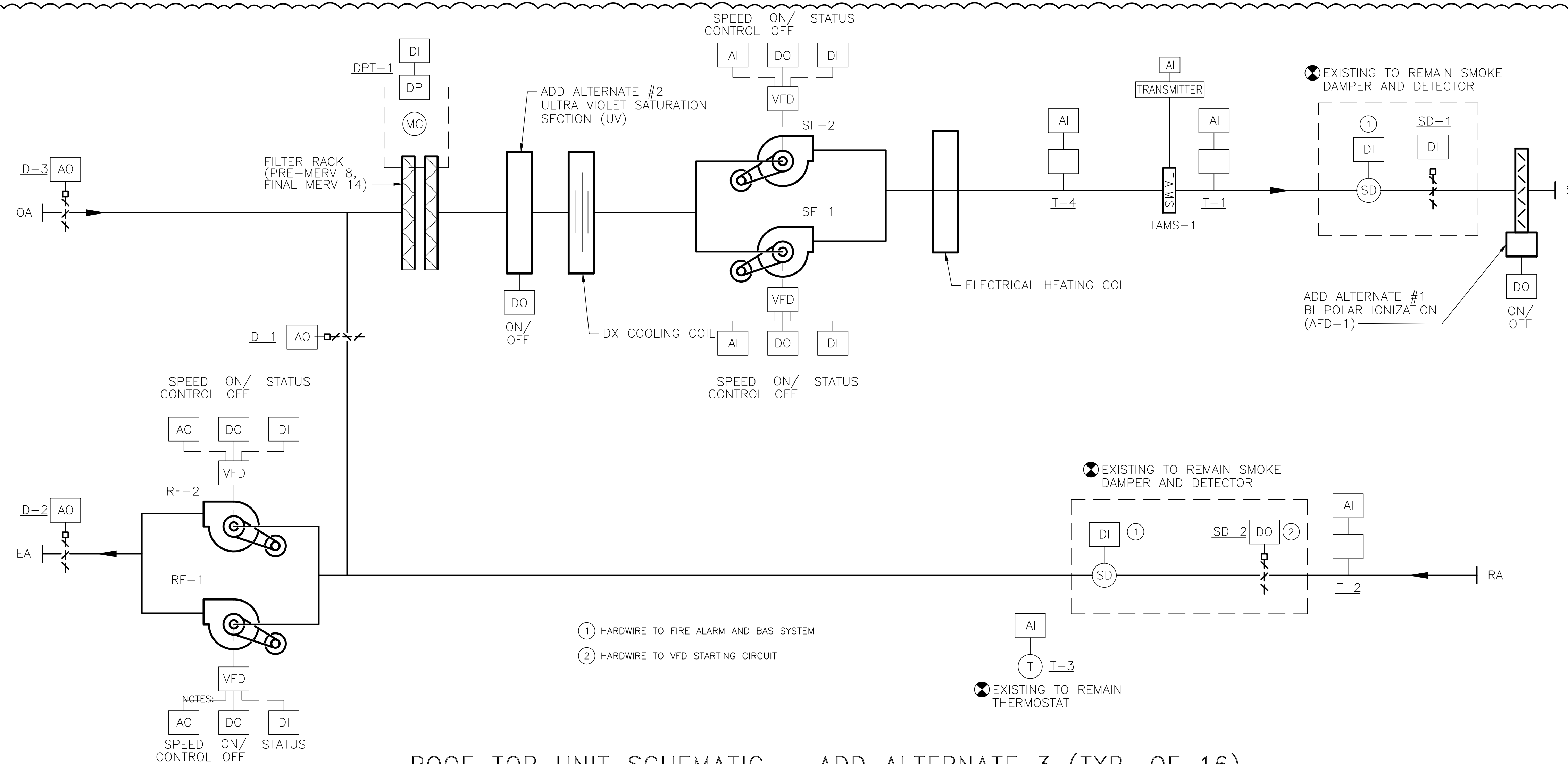
SAFETIES:  
TEMPERATURE TRANSMITTER, TT-1, SHALL ALARM 5 DEGREES ABOVE OR BELOW SET POINT. IF TT-1 READS A TEMPERATURE OF 50 DEGREES F OR LOWER THE AHU SHALL DE-ENERGIZE AND SEND AN ALARM TO THE BAS. IF TT-1 READS A TEMPERATURE OF 95 DEGREES F OR HIGHER THE AHU SHALL DE-ENERGIZE AND SEND AN ALARM TO THE BAS.

IN THE EVENT OF A DIRTY FILTER WHEN THE SUPPLY FAN IS ENERGIZED UNIT SHALL SEND AN ALARM TO THE BAS.

A DISCHARGE PRESSURE TRANSDUCER WILL BE MONITORED ON EACH COMPRESSOR OR REFRIGERANT CIRCUIT. THE CONDENSER FAN SIGNAL (VFD) IS MODULATED TO MAINTAIN 110F (365PSI) CONDENSING TEMPERATURE DURING THE COOLING AND DEHUMIDIFICATION MODES. DURING THE HEATING MODE THE CONDENSER FAN SIGNAL WILL BE AT 100%. ONCE INITIALIZED, THE CONDENSER FANS WILL RUN AT 100% FOR 30SEC AND THEN DROP TO 50% FOR AN ADDITIONAL 30SEC.

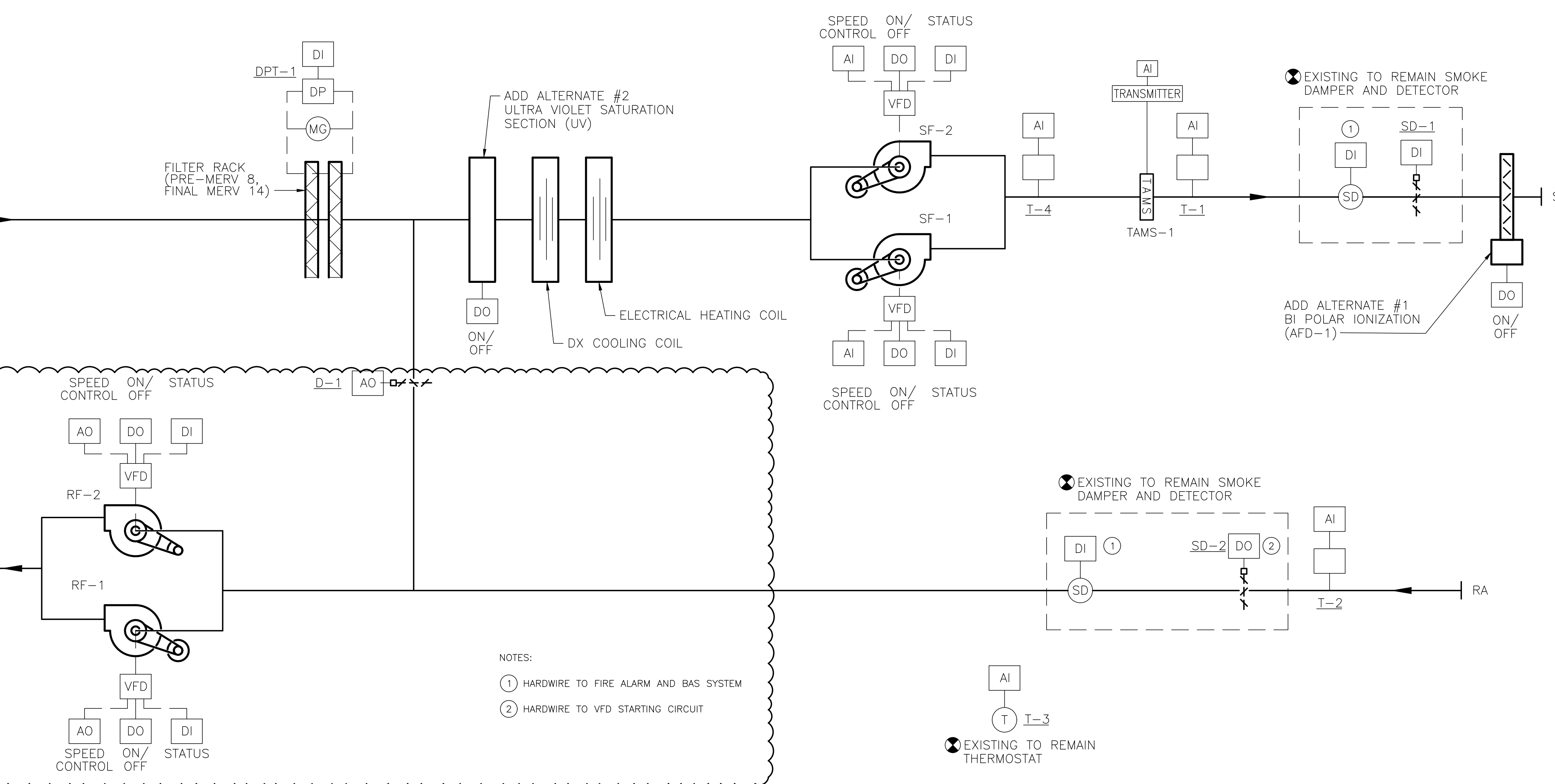
UNITS SHALL BE INTEGRATED INTO THE BUILDING EXISTING CONTROL PANEL AND BUILDING SMOKE CONTROL SEQUENCING. LOCATION OF BUILDING RTU CONTROL PANEL SHALL BE CONFIRMED AND VERIFIED BY THE CONTRACTOR. TYPICAL PANEL LOCATIONS ARE LOCATED ON THE FOURTH FLOOR ELECTRICAL CLOSET. EXISTING SMOKE EVACUATION PUSH BUTTON FOR EACH BUILDING SHALL REMAIN AND BE INTEGRATED INTO NEW UNITS.

POINT DESCRIPTION / DEVICE	AIR HANDLING UNIT CONTROL					ALARMABLE	REMARKS
	AI	AO	DO	DI	DIGITAL STATUS		
SF-1		x	x		x	x	SUPPLY FAN
SF-2		x	x		x	x	SUPPLY FAN
RF-1		x	x		x	x	RETURN FAN
RF-2		x	x		x	x	RETURN FAN
D-1		x					RETURN DAMPER
D-2		x					RELIEF DAMPER
D-3		x					OUTSIDE AIR DAMPER
SD					x	x	TYP. 2
SD-1					x		TYP. 2
T-1		x				x	DUCT TEMP (SA)
T-2		x				x	DUCT TEMP (RA)
T-3		x				x	SPACE TEMP
FS-1		x				x	FREEZE STAT
PF-1 (PRE FILTER ALARM)		x				x	
AFD-1, BI POLAR IONIZATION (ADD ALTERNATE #1)			x			x	
UV-1, ULTRA VIOLET LIGHT (ADD ALTERNATE #2)			x			x	



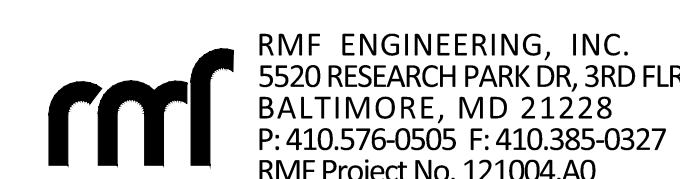
ROOF TOP UNIT SCHEMATIC - ADD ALTERNATE 3 (TYP. OF 16)

SCALE: NONE



ROOF TOP UNIT SCHEMATIC - BASE BID (TYP. OF 16)

SCALE: NONE



RMF ENGINEERING, INC.  
5520 RESEARCH PARK DR, 3RD FLR  
BALTIMORE, MD 21228  
P: 410.576-0505 F: 410.385-0327  
RMF Project No. 121004.40

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License Number: 54343 EXP. DATE: 05/14/2025

REVISIONS

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	RE-BID SUBMISSION		03-20-2024

ANNE ARUNDEL COUNTY  
DEPARTMENT OF PUBLIC WORKS

APPROVED	DATE	APPROVED	DATE	SCALE: NTS	GENERAL ENGINEERING
CHIEF ENGINEER	DATE	PROJECT MANAGER	DATE	DRAWN BY: MFS	HERITAGE COMPLEX - RTU REPLACEMENT
APPROVED	DATE	APPROVED	DATE	CHECKED BY: MFS	MECHANICAL CONTROL SEQUENCES
ASSISTANT CHIEF ENGINEER	DATE	CHIEF, RIGHT OF WAY SERVICES	DATE	PROJECT NO. C537800	Drawing No. M700
				SHEET NO. 17 OF 26	
				PROPOSAL NO. C537896	