GENERAL NOTES:

1. INTENT OF PROJECT IS FOR NEW MATERIALS AND COMPONENTS TO MATCH EXISTING. ALL MATERIALS SHALL BE APPROVED BY IMMUCELL.
2. REVIEW PROTOCOL AND PROCEDURES WITH IMMUCELL PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING IMMUCELL PROTOCOL AND PROCEDURES BY ITS EMPLOYEES AND SUB-CONTRACTORS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS IN THE FIELD PRIOR TO ANY DEMOLITION OR NEW INSTALLATION.
4. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE INTERNATIONAL BUILDING CODE AND ANY AND ALL OTHER APPLICABLE FEDERAL, STATE, AND LOCAL ORDINANCES.
5. THE CONTRACTOR SHALL VERIFY SHUTDOWN AND ISOLATION VALVE LOCATIONS. THE CONTRACTOR SHALL COORDINATE ALL SHUTDOWN WORK WITH THE PROJECT COORDINATOR FOR IMMUCELL.
6. THE CONTRACTOR SHALL VISIT THE SITE, BECOME FAMILIAR WITH THE EXISTING FIELD CONDITIONS, AND MAKE HIS OWN ESTIMATE OF THE DIFFICULTIES IN EXECUTING THE WORK PRIOR TO SUBMITTING ITS BID. NO COMPENSATION WILL BE AWARDED TO THE CONTRACTOR BASED ON A CLAIM OF LACK OF KNOWLEDGE OF EXISTING FIELD CONDITIONS.
7. THE CONTRACTOR SHALL REPORT ALL CHANGES IN THE WORK TO HODESS CONSTRUCTION CORPORATION.
8. PIPING, DUCTWORK AND EQUIPMENT ARE NOT COMPLETELY DETAILED ON THE DIAGRAMS AND ELEVATIONS PROVIDED ON THE DRAWINGS ARE APPROXIMATE. THE DISTRIBUTION IS INTENDED AS A GENERAL ROUTING ONLY, BUT DOES ILLUSTRATE THE DESIRED LOCATION. THE CONTRACTOR SHALL AVOID INTERFERENCES WITH OTHER EQUIPMENT AND THE WORK OF OTHER DISCIPLINES.
9. NOT ALL VALVES, INSTRUMENTS AND CONTROLS ARE SHOWN IN THE PLAN VIEWS. INSTALL PIPING AND VALVES AS SHOWN ON PIPING AND INSTRUMENTATION DIAGRAMS AND DETAILS.
10. DUCTWORK, PIPING AND SUPPORTS SHALL NOT INTERFERE WITH EQUIPMENT MAINTENANCE ACCESS OR PULL SPACE.
11. DRAWINGS OF REVISED DUCTWORK OR PIPING ARRANGEMENTS SHALL BE SUBMITTED IF ITEMS ARE NOT SHOWN ON THE DRAWINGS. REVISIONS SHALL BE SUBJECT TO REVIEW AND APPROVAL BY THE ENGINEER PRIOR TO COMMENCEMENT OF THE CHANGES.
12. MECHANICAL CONTRACTOR SHALL PROVIDE ALL SUPPLEMENTARY STRUCTURAL SUPPORTS, ANGLE IRON, PLATES, ROD, ETC. AS NECESSARY FOR PROPER INSTALLATION OF PIPING, EQUIPMENT, AND ACCESSORIES.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR SIZING SUPPORTS, UNISTRUT RACKS, TRAPEZE STEEL, PIPE SUPPORT COMPONENTS, ETC.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGE MADE BY ITS FIRM ON NEW OR EXISTING EQUIPMENT INSTALLED OR RELOCATED BY HIM UNDER THIS CONTRACT. THIS SHALL INCLUDE ALL TOUCH-UP PAINTING.
15. THE CONTRACTOR SHALL RETURN AS-BUILT DRAWINGS TO HODESS CONSTRUCTION CORPORATION.
16. CONTRACTOR TO PROVIDE ALL MATERIALS NEEDED FOR CONSTRUCTION UNLESS OTHERWISE NOTED OR DIRECTED.
17. DIELECTRIC UNIONS SHALL BE INSTALLED BETWEEN DISSIMILAR METALS IN SOLDERED AND THREADED PIPING SYSTEMS AND INSULATED FLANGES FOR WELDING SYSTEMS.
18. CONTRACTOR TO LABEL ALL NEW PIPING AND DUCTWORK EVERY 10 FEET. LABELING TO INCLUDE DIRECTION OF FLOW AS WELL AS DESCRIPTION OF CONTENTS. LABELING SHALL BE COLOR/SIZE ACCORDING TO OSHA SPECIFICATIONS.
19. PRIOR TO CONNECTING TO ANY EXISTING PIPING, CONFIRM TIE-IN LOCATIONS WITH IMMUCELL PROJECT MANAGER AND HCC SITE SUPERVISOR.
    A. PROVIDE HANGERS, SUPPORTS, AND INSERTS CONFORMING TO:
    1. MSS SP-58
    2. MSS SP-69
    3. ANSI B31.9
    B. PROVIDE PIPE HANGERS, SUPPORTS, AND ACCESSORIES WHICH:
    1. PERMIT VERTICAL ADJUSTMENT AFTER INSTALLATION OF PIPING.
    2. ARE DESIGNED FOR SUPPORT OF PIPING AND CONTENTS UNDER ALL CONDITIONS OF OPERATION INCLUDING TESTING.
    3. WILL NOT CRUSH, INDENT, OR OTHERWISE DAMAGE PIPE, PIPE INSULATION, OR JACKETING.
    C. PROVIDE COMPLETE HANGER AND SUPPORT ASSEMBLIES, INCLUDING CLAMPS, RODS, WASHERS, NUTS, TURNBUCKLES, AND LOCKING DEVICES, CONSTRUCTED FOR COMPATIBILITY WITH ITEMS SUPPORTED AND SUPPORTING STRUCTURE.
    D. PROVIDE ALL SIMILAR SUPPORT COMPONENTS BY SAME MANUFACTURER.
    E. PROVIDE OVERSIZED CLEVIS AND/OR ROLLER HANGERS TO FIT ON OUTSIDE OF INSULATED PIPING.
    F. PROVIDE INSULATION PROTECTORS AT SUPPORT POINTS FOR ALL INSULATED UNJACKETED PIPING.
    G. SPECIAL REQUIREMENTS: ALL COMPONENTS SHALL BE SUITABLY SIZED FOR THE LOAD SUPPORTED.
20. SYSTEM CLEANING AND TESTING PROCEDURES SHALL BE SUBMITTED TO AND APPROVED BY OWNER AND HCC.
21. CONTRACTOR SHALL SEAL ALL WALL AND FLOOR PENETRATIONS TO PROVIDE LEAK TIGHT CLEAN SPACE.
22. CONTROLS, BALANCING AND CERTIFICATION:
    A. CONTROLS: CONTRACTOR SHALL PROVIDE CONTROL DEVICES AND MATERIALS.
    1. CONTROLS CONTRACTOR SHALL PROVIDE AND INSTALL ALL REQUIRED DEVICES AND SENSORS, AND PERFORM TIE-INS TO EXISTING FACILITY SYSTEM.

SCOPE OF WORK

1. THIS PROJECT INCLUDES THE PARTIAL RENOVATION OF 2,800 SF OF EXISTING SPACE INTO A ISO 8 CLEANROOM. SELECTIVE DEMOLITION OF EXISTING SYSTEMS SHALL BE REQUIRED. THIS WORK INCLUDES THE INSTALLATION OF A NEW AIR HANDLER WITH DX COOLING AND ELECTRIC HEAT, CONDENSING UNIT, HEPA FAN FILTERS UNITS, DUCTWORK DISTRIBUTION, REFRIGERATION PIPING AND CONTROLS.

SUBMITTALS

1. PRODUCT DATA: SUBMIT MANUFACTURERS PRODUCT DATA AND INSTALLATION INSTRUCTIONS FOR EACH MATERIAL AND PRODUCT USED.
2. OPERATION AND MAINTENANCE DATA: SUBMIT MANUFACTURERS OPERATION AND MAINTENANCE DATA, INCLUDING OPERATION INSTRUCTIONS, LIST OF SPARE PARTS AND MAINTENANCE SCHEDULE.

OPERATION AND MAINTENANCE DATA

1. COMMENCE PREPARATION OF THE OPERATING AND MAINTENANCE (O&M) MANUALS IMMEDIATELY UPON RECEIPT OF "APPROVED" OR "APPROVED AS NOTED" SHOP DRAWINGS AND SUBMIT EACH SECTION WITHIN ONE MONTH. THE FINAL SUBMISSION SHALL BE NO LATER THAN TWO MONTHS PRIOR TO THE PROJECTED DATE OF SUBSTANTIAL COMPLETION OF THE PROJECT.
2. THE MANUAL SHALL CONSIST OF (3) SETS OF MANUALS AND INCLUDE (3) SETS OF CDS, WHICH SHALL CONTAIN THE SCANNED CONTENT OF THE ENTIRE MANUAL. THE MANUAL SHALL HIGHLIGHT THE ACTUAL EQUIPMENT USED AND NOT BE A MASTER CATALOG OF ALL SIMILAR PRODUCTS OF THE MANUFACTURER.

WARRANTIES

1. SUBMIT MANUFACTURER'S STANDARD REPLACEMENT WARRANTIES FOR MATERIAL AND EQUIPMENT FURNISHED UNDER THIS SECTION. SUCH WARRANTIES SHALL BE IN ADDITION TO AND NOT IN LIEU OF ALL LIABILITIES WHICH THE MANUFACTURER AND THE HVAC SUBCONTRACTOR MAY HAVE BY LAW OR BY PROVISIONS OF THE CONTRACT DOCUMENTS.
2. ALL MATERIALS, EQUIPMENT AND WORK FURNISHED UNDER THIS SECTION SHALL BE GUARANTEED AGAINST ALL DEFECTS IN MATERIALS AND WORKMANSHIP FOR A MINIMUM PERIOD OF ONE YEAR COMMENCING WITH THE DATE OF SUBSTANTIAL COMPLETION. WHERE INDIVIDUAL EQUIPMENT SECTIONS SPECIFY LONGER WARRANTEES, PROVIDE THE LONGER WARRANTEE. ANY FAILURE DUE TO DEFECTIVE MATERIAL, EQUIPMENT OR WORKMANSHIP WHICH MAY DEVELOP, SHALL BE CORRECTED AT NO EXPENSE TO THE OWNER INCLUDING ALL DAMAGE TO AREAS, MATERIALS AND OTHER SYSTEMS RESULTING FROM SUCH FAILURES.

INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

1. IT IS THE INTENTION OF THE SPECIFICATIONS AND DRAWINGS TO CALL FOR COMPLETE, FINISHED WORK, TESTED AND READY FOR CONTINUOUS OPERATION. ANY APPARATUS, APPLIANCE, MATERIAL OR WORK NOT SHOWN ON THE DRAWINGS, BUT MENTIONED IN THE SPECIFICATIONS OR VICE VERSA, OR ANY INCIDENTAL ACCESSORIES NECESSARY TO MAKE THE WORK COMPLETE IN ALL RESPECTS AND READY FOR OPERATION, EVEN IF NOT PARTICULARLY SPECIFIED, SHALL BE PROVIDED BY THE HVAC SUBCONTRACTOR OR HIS/HER SUB SUBCONTRACTORS, WITHOUT ADDITIONAL EXPENSE TO THE OWNER OR HODESS CONSTRUCTION CORPORATION.
2. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC. THE LOCATIONS OF ALL ITEMS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS MUST BE DETERMINED AT THE SITE AND SHALL HAVE THE APPROVAL OF THE ARCHITECT BEFORE BEING INSTALLED. THE HVAC SUBCONTRACTOR SHALL FOLLOW DRAWINGS, INCLUDING SHOP DRAWINGS, IN LAYING OUT WORK AND SHALL CHECK THE DRAWINGS OF OTHER TRADES TO VERIFY SPACES IN WHICH WORK WILL BE INSTALLED. MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITIONS. WHERE SPACE CONDITIONS APPEAR INADEQUATE, NOTIFY THE ARCHITECT BEFORE PROCEEDING WITH THE INSTALLATION. THE HVAC SUBCONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE WORK.
3. SIZES OF DUCTS AND PIPES AND ROUTING ARE SHOWN, BUT IT IS NOT INTENDED TO SHOW EVERY OFFSET AND FITTING, NOR EVERY STRUCTURAL DIFFICULTY THAT MAY BE ENCOUNTERED. TO CARRY OUT THE INTENT AND PURPOSE OF THE DRAWINGS, ALL NECESSARY PARTS TO MAKE COMPLETE APPROVED WORKING SYSTEMS READY FOR USE, SHALL BE FURNISHED WITHOUT EXTRA CHARGE.

INSPECTION OF SITE CONDITIONS

1. PRIOR TO SUBMISSION OF BID, VISIT THE SITE AND REVIEW THE RELATED CONSTRUCTION DOCUMENTS TO DETERMINE THE CONDITIONS UNDER WHICH THE WORK HAS TO BE PERFORMED. SEND A REPORT, IN WRITING, TO THE DESIGN BUILD CONTRACTOR'S REPRESENTATIVE, NOTING ANY CONDITIONS WHICH MIGHT ADVERSELY AFFECT THE WORK OF THIS SECTION OF THE SPECIFICATIONS.

SPECIFICATION:

DEMOLITION AND REMOVAL:

A. THE EXISTING FACILITY WILL CONTINUE TO OPERATE DURING ALL PHASES OF THE DEMOLITION WORK AND SUBSEQUENT CONSTRUCTION. NO INTERRUPTION OF THE SYSTEMS WILL BE PERMITTED WITHOUT PRIOR APPROVAL OF THE OWNER'S REPRESENTATIVE.

B. SUBMIT PROPOSED METHODS AND SEQUENCE OF OPERATIONS FOR THE SELECTIVE DEMOLITION WORK TO THE DESIGN BUILD CONTRACTORS REPRESENTATIVE FOR REVIEW PRIOR TO THE START OF THE WORK.

C. PERFORM ALL DEMOLITION WHILE ENSURING MINIMUM INTERFERENCE WITH ADJACENT OCCUPIED AREAS.

D. MECHANICAL CONTRACTOR TO IDENTIFY, MAKE SAFE, CUT LOOSE AND CAP ALL EXISTING EQUIPMENT, COMPONENTS, DEVICES, ACCESSORIES AND DISTRIBUTION SYSTEMS AS INDICATED ON THE DRAWINGS.

E. COORDINATE WITH THE CONTRACTOR AND SUBCONTRACTORS TO PROVIDE DISCONNECTION PRIOR TO EQUIPMENT REMOVAL.

F. WHERE SECTIONS OF A SYSTEM ARE TO BE REMOVED AND THE SYSTEM SERVES OTHER AREAS OF THE BUILDING THAT ARE OUTSIDE THE SCOPE OF THE WORK, PERFORM THE FOLLOWING:

1. COORDINATE THE TEMPORARY SHUT DOWN OF THE SYSTEM WITH THE OWNER'S REPRESENTATIVE.
2. INSTALL SUPPORTS IN THE REMAINING ACTIVE SECTIONS OF THE SYSTEM AS REQUIRED BY THE REMOVAL OF NEARBY SUPPORTS ASSOCIATED WITH THE DEMOLITION.
3. ISOLATE THE SYSTEM.
4. CAP THE REMAINING SYSTEM SECTION, LEAVING THE REMAINDER OF THE SYSTEM ACTIVE.

G. MECHANICAL CONTRACTOR SHALL REMOVE AND LOWER ALL COMPONENTS (DUCTWORK, PIPING, ETC) TO THE FLOOR FOR REMOVAL,BY THE DESIGN BUILD CONTRACTOR, FROM WORK AREA. REMOVE EQUIPMENT BY UNFASTENING AT THE SUPPORTS OR ATTACHMENTS. THEN REMOVE THE ATTACHMENTS FROM THE BUILDING, LEAVING NO COMPONENT OF THE ORIGINAL INSTALLATION.

H. MECHANICAL CONTRACTOR SHALL DISCONNECT ALL PIPING AND DUCTWORK CONNECTIONS AS WELL AS ANY CONTROL TERMINATIONS FROM EQUIPMENT TO BE DEMOLISHED SO THAT DESIGN BUILD CONTRACTOR CAN REMOVE EQUIPMENT FROM THE PREMISES.

I. ALL EQUIPMENT, ETC., NOT TURNED OVER TO THE OWNER SHALL BE PUT INTO THE GENERAL CONTRACTOR'S DUMPSTERS; BECOME THE PROPERTY OF THE DESIGN BUILD CONTRACTOR, AND SHALL BE REMOVED FROM THE SITE BY THE DESIGN BUILD CONTRACTOR.

J. PROVIDE TEMPORARY SHORING OR BRACING DURING THE DEMOLITION WORK TO PREVENT MOVEMENT, SETTLEMENT, OR COLLAPSE OF THE SYSTEM OR ADJACENT SYSTEMS DUE TO THE WORK.

K. THE OWNER SHALL CHOOSE TO TAKE POSSESSION OF THE EQUIPMENT OR NOT. IF THE OWNER CHOOSES NOT TO TAKE POSSESSION OF THE EQUIPMENT, THE SUBCONTRACTOR SHALL REMOVE THE EQUIPMENT AND DISPOSE OF THE EQUIPMENT.

L. EXERCISE CARE WITH EQUIPMENT THAT IS TO BE RELOCATED OR TURNED OVER TO THE OWNER, EXAMINE THE EQUIPMENT BEFORE REMOVAL IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE TO DETERMINE ITS CONDITION. MAKE A RECORD OF ANY MARKS, ETC. BY A PHOTOGRAPH OR VIDEOTAPE ACKNOWLEDGED BY THE OWNER'S REPRESENTATIVE.

M. EQUIPMENT TO BE TURNED OVER TO THE OWNER: DELIVER TO AN ON-SITE LOCATION DESIGNATED BY THE OWNER, AND OBTAIN ACKNOWLEDGMENT OF RECEIPT IN GOOD CONDITION.

N. PROMPTLY REPAIR ANY DAMAGE CAUSED TO ADJACENT FACILITIES OR AREAS THAT ARE DESIGNATED TO REMAIN AT NO ADDITIONAL COST TO THE OWNER.

O. MECHANICAL CONTRACTOR SHALL EVACUATE AND RECLAIM ALL REFRIGERANT FROM REFRIGERATION EQUIPMENT AND RECYCLE, PRIOR TO DEMOLITION BY THE DESIGN BUILD CONTRACTOR. ANY OTHER HAZARDOUS WASTE, SUCH AS MERCURY FROM THERMOMETERS OR THERMOSTATS; ETHYLENE GLYCOL; OR LEAD SHALL BE PROPERLY DISPOSED OF, FOLLOWING EPA GUIDELINES.

MATERIALS FOR INSTALLATION:

CENTRAL STATION AIR HANDLING UNITS

1. FABRICATE DRAW-THRU TYPE AIR HANDLING UNITS SUITABLE FOR THE SCHEDULED CAPACITIES AS MANUFACTURED BY ANNEXAIR, CARRIER, TRANE, YORK.
2. FABRICATE UNITS WITH A SUPPLY FAN SEGMENT PLUS ACCESSORIES, INCLUDING DX COOLING COIL SECTION, PRE-FILTER HIGH EFFICIENCY FILTER SECTION, MIXING BOX SECTION, ECONOMIZER SECTION, ACCESS SECTION EXHAUST AIR FAN SECTION AND ELECTRIC HEAT SECTION.
3. ALL INTERNAL COMPONENTS SPECIFIED IN THE AIR HANDLING UNIT SCHEDULE SHALL BE FACTORY FURNISHED AND INSTALLED. UNIT(S) SHALL BE COMPLETELY FACTORY ASSEMBLED.
4. UNITS SHALL BE MODULAR TYPE WITH FACTORY SHIPPING SPLITS. LIFTING LUGS WILL BE SUPPLIED ON EACH SIDE OF THE SPLIT TO FACILITATE RIGGING AND JOINING OF SEGMENTS.
5. THE ENTIRE UNIT SHALL BE PROVIDED WITH A FULL LENGTH, CONTINUOUS, BASE RAIL CHANNEL. BASE RAIL CHANNELS WILL BE FORMED OF A MINIMUM OF 12 GAGE GALVANIZED STEEL.
6. THE UNIT SHALL HAVE A FRAME CONSTRUCTION CONSISTING OF GALVANIZED STEEL VERTICAL AND HORIZONTAL STRUCTURAL MEMBERS. THE FRAME SHALL BE CONSTRUCTED TO PERMIT COMPLETE REMOVAL OF THE WALL AND ROOF PANELS WITHOUT AFFECTING THE STRUCTURAL INTEGRITY OF THE UNIT.
7. ALL SEGMENTS SHALL BE DOUBLE WALL AND SHALL BE CONSTRUCTED OF G90 MILL GALVANIZED SHEET STEEL, FORMED AND REINFORCED TO PROVIDE A RIGID ASSEMBLY. THE EXTERIOR CASING SHALL BE CONSTRUCTED OF A MINIMUM 18 GAGE GALVANIZED STEEL. THE INTERIOR LINING SHALL BE A SOLID LINING OF A MINIMUM OF 20 GAGE GALVANIZED STEEL.
8. ALL ACCESS PANELS SHALL BE COMPLETELY REMOVABLE FOR UNIT ACCESS AND REMOVAL OF COMPONENTS.
9. ALL PANELS SHALL BE COMPLETELY GASKETED PRIOR TO SHIPMENT WITH A MINIMUM OF 1/4" THICK AND 3/4" WIDE CLOSED CELL NEOPRENE.
10. ALL PANELS SHALL BE INSULATED WITH 2" 1.5# FIBERGLASS INSULATION. THE PANEL INSULATION MUST BE A FULL 2" (NON COMPRESSED) THROUGHOUT THE ENTIRE UNIT. UNITS WITH LESS THAN 2" OF INSULATION IN ANY PART OF THE WALLS, FLOOR, ROOF OR DRAIN PAN SHALL NOT BE ACCEPTABLE. THE INSULATION SHALL MEET THE FLAME AND SMOKE GENERATION REQUIREMENTS OF NFPA 90A.
11. THE COOLING COIL SEGMENTS SHALL HAVE A FULL WIDTH, DOUBLE-SLOPED DRAIN PAN THAT EXTENDS DOWNSTREAM OF THE COIL AND MEETS ASHRAE 62.1 REQUIREMENTS FOR INDOOR AIR QUALITY.
12. THE COOLING COIL DRAIN PAN SHALL BE SLOPED TO ASSURE POSITIVE CONDENSATE DRAINAGE WITH CONNECTION ON ACCESS SIDE. THE PAN SHALL BE OF DOUBLE WALL CONSTRUCTION WITH A STAINLESS STEEL LINER AND HAVE A MINIMUM OF 2" OF INSULATION (UNCOMPRESSED).
13. DOORS SHALL BE OF THE SAME THICKNESS AND CONSTRUCTION AS THE WALL PANELS. A 3/8" BULB TYPE GASKET SHALL BE PROVIDED AROUND THE ENTIRE DOOR PERIMETER. INDUSTRIAL STYLE HINGES SHALL PERMIT A COMPLETE 180 DEGREE DOOR SWING.
14. THE SUPPLY FAN SEGMENT SHALL BE EQUIPPED WITH HOUSED DOUBLE WIDTH DOUBLE INLET (DWDI) CENTRIFUGAL TYPE WHEELS. ALL FANS SHALL BE AIRFOIL (AF) OR BACKWARD CURVED (BC) AS REQUIRED FOR STABLE OPERATION.
15. FAN AND UNIT PERFORMANCE SHALL BE RATED AND CERTIFIED IN ACCORDANCE WITH ARI STANDARD 430.
16. THE RELIEF FAN SEGMENT SHALL BE EQUIPPED WITH HOUSED DOUBLE WIDTH DOUBLE INLET (DWDI) CENTRIFUGAL TYPE WHEELS. ALL FANS SHALL BE AIRFOIL (AF) OR BACKWARD CURVED (BC) AS REQUIRED FOR STABLE OPERATION.
17. FAN AND FAN MOTOR SHALL BE INTERNALLY MOUNTED AND ISOLATED ON A FULL WIDTH ISOLATOR SUPPORT CHANNEL USING 2" SPRINGS. THE FAN DISCHARGE SHALL BE CONNECTED TO THE FAN CABINET USING A FLEXIBLE CONNECTION. THE ISOLATOR SUPPORT RAIL SHALL BE STRUCTURALLY SUPPORTED FROM THE UNIT BASE. CANTILEVER SUPPORTS OF THE ISOLATOR SUPPORT BASE ARE UNACCEPTABLE.
18. ALL FANS SHALL BE CONTROLLED WITH FACTORY MOUNTED VARIABLE FREQUENCY DRIVES.
19. FAN BEARINGS SHALL BE SELF ALIGNING, PILLOW BLOCK OR FLANGED TYPE REGREASEABLE BALL BEARINGS AND SHALL BE DESIGNED FOR AN AVERAGE LIFE (L50) OF AT LEAST 200,000 HOURS. ALL BEARINGS SHALL BE FACTORY LUBRICATED AND EQUIPPED WITH GREASE FITTINGS/LUBE LINES EXTENDED TO THE MOTOR SIDE OF THE FAN.
20. FAN DRIVES SHALL BE SELECTED FOR A 1.5 SERVICE FACTOR AND THE ANTI-STATIC BELTS SHALL BE FURNISHED. ALL SHEAVES SHALL BE ADJUSTABLE PITCH.
21. FAN SHAFTS SHALL BE SELECTED TO OPERATE WELL BELOW THE FIRST CRITICAL SPEED AND EACH SHAFT SHALL BE FACTORY COATED AFTER ASSEMBLY WITH AN ANTI-CORROSION COATING.
22. FAN MOTORS SHALL BE NEMA DESIGN BALL BEARING TYPE WITH ELECTRICAL CHARACTERISTICS AND HORSEPOWER AS SPECIFIED ON THE SCHEDULE. MOTORS SHALL BE 1800 RPM, OPEN DRIP PROOF TYPE.
23. ALL MOTORS SHALL BE PREMIUM EFFICIENCY.
24. THE MOTOR SHALL BE MOUNTED ON THE SAME ISOLATION BASE AS THE FAN. THE MOTOR SHALL BE ON AN ADJUSTABLE BASE.
25. COOLING COILS SHALL BE FURNISHED TO MEET THE PERFORMANCE REQUIREMENTS SET FORTH IN THE SCHEDULE. ALL COILS SHALL HAVE PERFORMANCE CERTIFIED IN ACCORDANCE WITH ARI STANDARD 410.
26. DX COILS SHALL BE 5/8" O.D. COPPER TUBE, STAGGERED IN DIRECTION OF AIRFLOW. TUBES SHALL BE MECHANICALLY EXPANDED. THE TUBES SHALL HAVE A MINIMUM TUBE WALL THICKNESS OF 0.020". EXTENDED SURFACE SHALL CONSIST OF ALUMINUM FINS WITH A MINIMUM THICKNESS OF 0.006".
27. COIL SHALL BE TESTED TO 325 PSIG COMPRESSED AIR UNDER WATER. THE COMPLETED COIL SHALL BE DEHYDRATED AND SEALED FOR SHIPMENT. EACH COIL SHALL BE FURNISHED WITH A BRASS DISTRIBUTOR WITH SOLDER-TYPE CONNECTIONS. SUCTION AND DISCHARGE CONNECTIONS SHALL BE ON THE SAME SIDE.
28. ALL COILS SHALL BE INSTALLED ON TRACKS FOR EASY REMOVAL FROM THE AIR HANDLING UNIT.
29. HEADERS SHALL BE OF HEAVY SEAMLESS COPPER TUBING, SILVER-BRAZED TO TUBES. CONNECTIONS SHALL BE OF RED BRASS, WITH MALE PIPE THREADS, SILVER-BRAZED TO THE HEADERS. A 1/4" FPT, PLUGGED, VENT OR DRAIN TAP WILL BE PROVIDED ON EACH CONNECTION.
30. ELECTRIC HEAT OF CAPACITY, VOLTAGE AND STEPS OF CONTROL SPECIFIED SHALL BE PROVIDED AS AN INTEGRAL PART OF THE UNIT. FIELD INSTALLED SEGMENTS SHALL NOT BE ACCEPTABLE. THE ELECTRIC HEATER AND CONTROL PANEL SHALL BE A U.L. LISTED ELECTRIC DUCT HEATER.
31. ALL ELECTRIC HEATER ELEMENTS SHALL BE OF 80% NICKEL AND 20% CHROME. COIL ELEMENTS SHALL FLOAT FREELY IN CERAMIC BUSHINGS WHICH ARE STACKED IN SUPPORT BRACKETS, NOT EXCEEDING 3.5 INCHES APART. COILS SHALL BE MACHINE CRIMPED INTO STAINLESS STEEL TERMINALS WHICH ARE INSULATED WITH HIGH TEMPERATURE CERAMIC INSULATORS. HEATER CASING AND SUPPORT BRACKETS SHALL BE OF GALVANIZED STEEL.
32. ALL ELECTRIC HEATERS WILL BE SUPPLIED WITH INTERNAL WIRING OF CONTROLS, CONTACTORS, ETC. INCLUDING 120-VOLT, 60 HERTZ CONTROL CIRCUIT TRANSFORMER, AUTOMATIC RESET THERMAL CUT-OUT, AND SCR CONTROLS FOR CAPACITY MODULATION.
33. THREE SEPARATE POWER CONNECTIONS SHALL BE PROVIDED. ONE EACH FOR BOTH FANS (460V), ELECTRIC HEATER 460V, AND LIGHTS AND CONVENIENCE OUTLET (120V) RESPECTIVELY.

AIR-COOLED CONDENSING UNITS

1. GENERAL: UNITS SHALL BE ASSEMBLED ON HEAVY GAUGE STEEL MOUNTING/LIFTING RAILS AND SHALL BE WEATHER PROOFED. UNITS SHALL INCLUDE HERMETIC SCROLL COMPRESSOR(S), PLATE FIN CONDENSER COIL, FANS AND MOTORS, CONTROLS AND HOLDING CHARGE OF NITROGEN. UNITS SHALL BE SUITABLE FOR USE WITH REFRIGERANT HFC-410A, BE UL LISTED, CERTIFIED AND RATED IN ACCORDANCE WITH ARI STANDARD 210/240, 340/360 OR 365. UNIT EFFICIENCY SHALL MEET OR EXCEED THE MORE STRINGENT OF THE FOLLOWING: 1) SCHEDULED EFFICIENCY, OR 2) MINIMUM EFFICIENCY REQUIRED BY THE LATEST EDITION OF THE STATE ENERGY CODE OR ASHRAE 90-1. AIR-COOLED CONDENSING UNITS AS MANUFACTURED BY TRANE OR EQUIVALENT UNITS FROM YORK, OR CARRIER ARE ACCEPTABLE.
2. UNIT CASINGS SHALL BE CONSTRUCTED OF MINIMUM 18 GAUGE ZINC-COATED GALVANIZED STEEL. EXTERIOR SURFACES SHALL BE CLEANED, PHOSPHATIZED AND FINISHED WITH A WEATHER-RESISTANT BAKED ENAMEL FINISH. UNIT'S SURFACE SHALL BE TESTED 500 HOURS IN SALT SPRAY TEST. UNITS SHALL HAVE REMOVABLE END PANELS FOR ACCESS TO ALL MAJOR COMPONENTS AND CONTROLS.
3. SCROLL TYPE COMPRESSORS SHALL BE PROVIDED WITH VIBRATION ISOLATORS TO REDUCE TRANSMISSION OF NOISE AND VIBRATION TO BUILDING STRUCTURE, EQUIPMENT AND ADJACENT SPACES. ISOLATORS SHALL BE EITHER NEOPRENE-IN-SHEAR OR SPRING-FLEX TYPE. PROVIDE FLEXIBLE CONNECTORS FOR EACH COMPRESSOR. EACH REFRIGERANT CIRCUIT SHALL HAVE REFRIGERATION FILTER DRIER, AND BOTH LIQUID LINE AND SUCTION GAS LINE SERVICE VALVE WITH GAUGE PORTS.
4. THE UNITS SHALL HAVE DIRECT-DRIVE HERMETIC SCROLL COMPRESSOR(S) WITH CENTRIFUGAL OIL PUMP TO PROVIDE POSITIVE LUBRICATION TO MOVING PARTS. MOTOR(S) SHALL BE SUCTION GAS-COOLED. CRANKCASE HEATERS, DISCHARGE LINE THERMOSTATS, INTERNAL TEMPERATURE AND CURRENT-SENSITIVE MOTOR OVERLOADS SHALL BE INCLUDED FOR MAXIMUM PROTECTION. EXTERNAL HIGH AND LOW PRESSURE CUTOUT DEVICES SHALL BE PROVIDED. COMPRESSORS SHALL BE PROTECTED FROM SLUGGING. IF THIS PROTECTION REQUIRES EVAPORATOR DEFROST CONTROL, MANUFACTURER SHALL FURNISH ALL REQUIRED COMPONENTS FOR FIELD INSTALLATION BY THE CONTRACTOR.
5. PROVIDE TIME DELAY RELAY IN DUAL COMPRESSOR UNITS TO PREVENT COMPRESSORS FROM COMING ON LINE SIMULTANEOUSLY. TIMER SHALL HAVE MINIMUM 4-MINUTE TIMING PERIOD. PROVIDE ANTI-SHORT-CYCLE SOLID STATE TIMER IN ALL UNITS TO PREVENT RAPID ON-OFF COMPRESSOR CYCLING IN LIGHT LOAD CONDITIONS BY NOT ALLOWING COMPRESSOR TO OPERATE FOR 5-7 MINUTES UPON SHUTDOWN.
6. DUAL COMPRESSOR: UNITS SHALL HAVE TWO COMPRESSORS WITH TWO SEPARATE AND INDEPENDENT REFRIGERATION CIRCUITS. EACH REFRIGERATION CIRCUIT SHALL HAVE AN INTEGRAL SUB-COOLING CIRCUIT.
7. FIELD INSTALL A RAWEL DEVICES APR VALVE ON THE LEAD REFRIGERATION CIRCUIT TO PROVIDE FOR CAPACITY MODULATION. CONTRACTOR SHALL CONFIRM AND INSTALL ALL PIPE SIZING WITH MANUFACTURER.
8. COILS SHALL BE INTERNALLY FINNED OR SMOOTH BORE 3/8" COPPER TUBES MECHANICALLY BONDED TO CONFIGURED ALUMINUM PLATE FIN AS STANDARD. FACTORY PRESSURE AND LEAK TESTED TO 660 PSIG AIR PRESSURE. FOR ALL UNITS TO BE MOUNTED ON GRADE, PROVIDE METAL GRILLES WITH PVC COATING FOR COIL PROTECTION.
9. CONDENSER FAN(S) AND MOTOR(S) SHALL BE DIRECT-DRIVE, STATICALLY AND DYNAMICALLY BALANCED PROPELLER FAN(S) WITH ALUMINUM BLADES (WITH BLADE GUARDS) AND ELECTRO-COATED STEEL HUBS. FANS SHALL BE USED IN DRAW-THROUGH VERTICAL DISCHARGE POSITION. EITHER PERMANENTLY LUBRICATED TOTALLY ENCLOSED OR OPEN CONSTRUCTION MOTORS SHALL BE PROVIDED AND SHALL HAVE BUILT IN CURRENT AND THERMAL OVERLOAD PROTECTION. MOTOR(S) SHALL HAVE BALL OR ROLLER TYPE BEARINGS.
10. CONTROLS: CONDENSING UNITS SHALL BE COMPLETELY FACTORY WIRED WITH NECESSARY CONTROLS, ANTI-SHORT-CYCLE AND OTHER SAFETIES, AND CONTACTOR PRESSURE LUGS OR TERMINAL BLOCK FOR POWER WIRING. CONTROL WIRING SHALL BE 24-VOLT CONTROL CIRCUIT, WHICH INCLUDES FUSING AND CONTROL TRANSFORMER. UNITS SHALL BE WIRED FOR A SINGLE POINT POWER CONNECTION. UNITS SHALL PROVIDE EXTERNAL LOCATION FOR MOUNTING A FUSED DISCONNECT DEVICE.
11. LOW AMBIENT OPERATION: UNIT SHALL OPERATE DOWN TO AT LEAST 45F AMBIENT AS STANDARD. PROVIDE HEAD PRESSURE CONTROLS AS REQUIRED TO ALLOW UNIT TO OPERATE DOWN TO OF AMBIENT.
12. REFRIGERATION CIRCUIT(S): EACH REFRIGERATION CIRCUIT SHALL BE AVAILABLE FOR OPERATION WITH A NON-OZONE DEPLETING REFRIGERANT SUCH AS R410A. REFRIGERATION CIRCUITS SHALL BE PRE-PIPED AND LEAK TESTED READY FOR FIELD CONNECTION. ALL REFRIGERANT PIPING SHALL BE OF TYPE L COPPER PIPE. ALL UNITS SHALL BE FACTORY RUN TESTED USING REFRIGERANT TO VERIFY OPERATION PRIOR TO SHIPPING. UNITS SHALL BE DESIGNED TO PROVIDE DEHUMIDIFICATION CYCLE IN ADDITION TO COOLING CYCLE. EACH REFRIGERATION CIRCUIT SHALL HAVE THE FOLLOWING COMPONENTS:

A. THERMAL EXPANSION VALVE WITH EXTERNAL EQUALIZER
B. REFRIGERANT DISTRIBUTOR
C. LIQUID LINE SOLENOID VALVE
D. LIQUID LINE SIGHT GLASS
E. ACCESS VALVE
F. LIQUID LINE FILTER DRIER
G. LIQUID LINE SHUT-OFF VALVE
H. LOW PRESSURE CUT-OUT SWITCH
I. HIGH PRESSURE CUT-OUT SWITCH

FAN FILTER UNITS

1. HEPA FILTERS (99.99% -0.3 MICRON) SHALL BE ROOM-SIDE REMOVABLE WITH EXTRUDED ALUMINUM PLENUM AND ALUMINUM PERFORATED SCREEN, 1" URETHANE FOAM SOUND
2. LINER, UL94 HF-1 & UL181 RATED.
3. FILTERS SHALL BE SEALED TO UNIT PLENUM USING KNIFE EDGE/GEL SEAL CONSTRUCTION.
4. MOTOR SHALL BE AC TYPE 277V /1 PHASE, 60 CYCLE WITH SOLID STATE SPEED CONTROLLER, LED INDICATOR AND UNIT MOUNTED DISCONNECT SWITCH INCLUDED.
5. PLENUM FRAME SHALL BE DOP/LEAK TESTED. FILTERS SHALL BE IEST TESTED AND CERTIFIED.
6. PLENUM SHALL BE MILL FINISH AND EXPOSED USER SIDE SURFACES SHALL BE PAINTRED WHITE. PROVIDE ZINC PLATED EYEBOLTS FOR INSTALLATION. A STATIC PRESSURE PORT FOR FILTER TESTING SHALL BE INCLUDED.

AIR FILTERS

1. AIR FILTERS SHALL BE LISTED ACCORDING TO REQUIREMENTS OF UL 900.
2. EXTENDED SURFACE PLEATED PANEL FILTERS: FILTERS SHALL BE 2 INCH DEPTH, SECTIONAL, DISPOSABLE TYPE OF THE SIZES INDICATED AND SHALL HAVE AN AVERAGE EFFICIENCY OF 25 TO 30 PERCENT (MERV-8) WHEN TESTED ACCORDING TO ASHRAE 52.1. INITIAL RESISTANCE AT 400 FEET PER MINUTE SHALL NOT EXCEED 0.2 INCHES WATER GAUGE. FILTERS SHALL BE UL CLASS 2. MEDIA SHALL BE NONWOVEN COTTON AND SYNTHETIC FIBER MAT. A WIRE SUPPORT GRID BONDED TO THE MEDIA SHALL BE ATTACHED TO A MOISTURE RESISTANT FIBERBOARD FRAME. ALL FOUR EDGES OF THE FILTER MEDIA SHALL BE BONDED TO THE INSIDE OF THE FRAME TO PREVENT AIR BYPASS AND INCREASE RIGIDITY. FILTER SHALL BE EQUAL TO FARR 30/30.
3. CARTRIDGE/PANEL FILTERS: FILTERS SHALL BE 12 INCH DEPTH, SECTIONAL, DISPOSABLE TYPE OF THE SIZES INDICATED AND SHALL HAVE AN AVERAGE EFFICIENCY OF 90-95% (MERV-14) WHEN TESTED ACCORDING TO ASHRAE 52.1. INITIAL RESISTANCE AT 400 FPM SHALL NOT EXCEED 0.3INCHES WATER GAUGE. FILTERS SHALL BE CONSTRUCTED BY PLEATING A CONTINUOUS SHEET OF FILTER MEDIUM INTO CLOSELY SPACED PLEATS. FILTERS SHALL BE EQUAL TO FARR RIGA-FLO 200.
4. HOLDING FRAMES: FRAMES SHALL BE FABRICATED FROM NOT LIGHTER THAN 16 GAUGE ALUMINUM OR STAINLESS STEEL SHEET STEEL WITH RUST-INHIBITOR COATING MAY BE USED WHERE INDICATED. EACH HOLDING FRAME SHALL BE EQUIPPED WITH SUITABLE FILTER HOLDING DEVICES. HOLDING FRAME SEATS SHALL BE GASKETED. ALL JOINTS SHALL BE AIRTIGHT.

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1-9-14

CURRENT ISSUE STATUS:

REV	DESCRIPTION	DATE
0	ISSUED FOR PERMIT	1-9-14

GRAPHIC SCALE:
0" 1"

SCALE:	NONE
PROJECT MANAGER:	RAB
JC/DRAWN BY:	BAL
A/E OF RECORD:	RMW
CAD FILE:	13157-M-002
PROJECT NO:	13157
DATE:	1-9-14

SHEET TITLE:
HVAC
SPECIFICATIONS

SHEET No.
M-002