GENERAL REQUIREMENTS:

1. THE GENERAL REQUIREMENTS OF THE ARCHITECTURAL SPECIFICATIONS ARE A PART OF THESE SPECIFICATIONS. WHERE AN INCONSISTENCY EXISTS BETWEEN THE WORDING OR INTENT, THIS DIVISION SHALL TAKE PRECEDENCE.
2. THE STANDARD FORM OF GENERAL CONDITIONS ISSUED BY THE AMERICAN INSTITUTE OF ARCHITECTS DOCUMENT A201, LATEST EDITION, SHALL FORM PART OF THIS CONTRACT.
3. SPECIFICATIONS AND DRAWINGS ARE INTENDED TO BE COOPERATIVE. WHAT IS CALLED FOR BY EITHER SHALL BE AS BINDING AS IF CALLED FOR BY BOTH. ANY WORK OR MATERIALS NOT SPECIFICALLY MENTIONED THOUGH REQUIRED TO MAKE THE JOB COMPLETE, SHALL BE FURNISHED BY THE CONTRACTOR AT HIS EXPENSE.
4. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND MAY NOT SHOW EVERY CONDITION, OFFSET, BEND OR ELBOW WHICH MAY BE REQUIRED FOR THE SUCCESSFUL INSTALLATION OF THIS WORK. DRAWINGS WILL BE FOLLOWED AS CLOSELY AS POSSIBLE WITH ADDITIONAL FITTINGS INSTALLED AT NO ADDITIONAL COST TO THE OWNER.

LAWS, ORDINANCES, FEES, AND INSPECTIONS:

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES AND REGULATIONS APPLYING TO THE WORK AS DRAWN AND SPECIFIED. IF THE CONTRACTOR OBSERVES THAT THE DRAWINGS AND SPECIFICATIONS DO NOT COMPLY WITH ANY OF THE APPLICABLE LAWS, ORDINANCES, RULES AND REGULATIONS, HE SHALL PROMPTLY NOTIFY THE ENGINEER IN WRITING WHEN SUBMITTING HIS BID. ANY NECESSARY CHANGES IN THE WORK SHALL BE ADJUSTED AS PROVIDED FOR IN THE CONTRACT. IF THE CONTRACTOR PERFORMS ANY WORK CONTRARY TO SUCH LAWS, ORDINANCES, RULES AND REGULATIONS, HE SHALL BEAR ALL COSTS FOR CORRECTING THIS WORK.
2. ALL CONTRACTORS SHALL APPLY, PROCURE AND PAY FEES FOR ALL PERMITS AND INSPECTIONS OR OTHER OBLIGATIONS THAT THE CITY, COUNTY, STATE OR UTILITIES MAY REQUIRE IN ORDER FOR HIM TO DO HIS WORK.
3. EQUIPMENT AND APPLIANCES SHALL BE INSTALLED AS REQUIRED BY THE TERMS OF THEIR APPROVAL, IN ACCORDANCE WITH THE CONDITIONS OF THE LISTING, THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, AND THE CODE. MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL BE AVAILABLE ON THE JOB SITE AT THE TIME OF INSPECTION.

TRADE JURISDICTION AND COORDINATION OF WORK:

1. THIS CONTRACTOR SHALL FURNISH ALL LABOR OR MATERIALS NECESSARY FOR THE COMPLETE FULFILLMENT OF THIS WORK. FOR WORK OTHER THAN THAT WHICH IS GENERALLY ACCEPTED BY HIS TRADE, SUBLET ALL LABOR OR MATERIALS NECESSARY TO A CONTRACTOR ENGAGED IN THAT TRADE SO THAT THERE IS NO DELAY OR STOPPAGE OF WORK.
2. THE CONTRACTOR SHALL CONFER WITH OTHER TRADES WHOSE WORK MAY AFFECT HIS INSTALLATION TO AVOID INTERFERENCE BEFORE STARTING THE INSTALLATION. ALL CHANGES IN THE WORK OF THIS CONTRACTOR CAUSED BY HIS NEGLECT TO COORDINATE WITH OTHER TRADES SHALL BE MADE BY HIM AT HIS OWN EXPENSE.

WORKMANSHIP, MATERIALS, AND PRODUCTS:

1. ALL MATERIALS SHALL BE NEW AND OF FIRST QUALITY. ALL LABOR SHALL BE EXECUTED IN A NEAT, WORKMANLIKE MANNER AND SHALL BE PERFORMED BY MECHANICS SKILLED IN THEIR RESPECTIVE TRADES.
2. BASIS-OF-DESIGN PRODUCTS: WHERE A SPECIFIC MANUFACTURER'S PRODUCT IS NAMED, INCLUDING MAKE OR MODEL NUMBER OR OTHER DESIGNATION, THIS ESTABLISHES THE SIGNIFICANT QUALITIES RELATED TO TYPE, FUNCTION, DIMENSION, IN-SERVICE PERFORMANCE, PHYSICAL PROPERTIES, APPEARANCE, AND OTHER CHARACTERISTICS, FOR PURPOSES OF EVALUATING COMPARABLE PRODUCTS OF OTHER NAMED MANUFACTURERS. THE DRAWINGS AND SPECIFICATIONS INDICATE SIZES, PROFILES, DIMENSIONS, AND OTHER CHARACTERISTICS THAT ARE BASED ON THE PRODUCT NAMED.
3. WHERE THE TERM "PROVIDE" IS INDICATED ON THE DRAWINGS AND SPECIFICATIONS; THIS MEANS FURNISH AND INSTALL THE EQUIPMENT OR SYSTEM, COMPLETE AND READY FOR THE INTENDED USE.
4. PROVIDE "PLENUM RATED" EQUIPMENT WHERE REQUIRED BY LOCAL CODE.

REQUESTS FOR INFORMATION:

1. ALL REQUEST FOR INFORMATION (RFI) OR QUESTIONS DURING THE BIDDING AND/OR CONSTRUCTION PROCESS SHALL BE SUBMITTED IN WRITING TO THE GENERAL CONTRACTOR, CONSTRUCTION MANAGER, ARCHITECT, AND/OR ENGINEER. THERE WILL BE NO RESPONSE TO RFIs THAT ARE NOT SUBMITTED IN WRITTEN FORM. ANY FORMAL OR INFORMAL DISCUSSION OR PHONE CONVERSATION DOES NOT CONSTITUTE THE AUTHORIZATION TO PROCEED OR THE ENGINEER'S APPROVAL.
2. THE "RFI" MUST CONTAIN THE FOLLOWING INFORMATION. FAILURE TO COMPLY WILL RENDER THE RFI VOID AND IT WILL BE RETURNED UNANSWERED:
   A. PROJECT NAME, FIRMS NAME, AUTHOR'S NAME, DATE.
   B. DRAWING NUMBER AND DRAWING DATE FOR WHICH THE "RFI" REFERS TO.
   C. INFORMATION REQUEST OR QUESTION TO BE ANSWERED.

CLEAN UP:

1. UPON COMPLETION OF THE INSTALLATION OF THE MECHANICAL WORK, CLEAN INSTALLED SURFACES ACCORDING TO WRITTEN INSTRUCTIONS OF MANUFACTURER OR FABRICATOR OF THE PRODUCT INSTALLED, USING ONLY CLEANING MATERIALS SPECIFICALLY RECOMMENDED. IF SPECIFIC CLEANING MATERIALS ARE NOT RECOMMENDED, USE CLEANING MATERIALS THAT ARE NOT HAZARDOUS TO HEALTH OR PROPERTY AND THAT WILL NOT DAMAGE EXPOSED SURFACES.
2. CLEAN METAL-DUCT SYSTEM COMPONENTS BY REMOVING VISIBLE SURFACE CONTAMINANTS AND DEPOSITS. MARK POSITION OF DAMPERS AND AIR-DIRECTIONAL MECHANICAL DEVICES BEFORE CLEANING, AND RESTORE TO THEIR MARKED POSITION ON COMPLETION. CLEAN ENTIRE SYSTEM OF RUBBISH, PLASTER, DIRT, ETC., BEFORE INSTALLING GRILLES OR DIFFUSERS. REPLACE FILTERS AND SCREENS WITH NEW FILTERS AND SCREENS.
3. FLUSH HYDRONIC PIPING SYSTEMS WITH CLEAN WATER. REMOVE AND CLEAN OR REPLACE STRAINER SCREENS. AFTER CLEANING AND FLUSHING HYDRONIC PIPING SYSTEMS, BUT BEFORE BALANCING, REMOVE DISPOSABLE FINE-MESH STRAINERS IN PUMP SUCTION DIFFUSERS.
4. REPAIR MARRED AND DAMAGED FACTORY-PAINTED FINISHES WITH MATERIALS AND PROCEDURES TO MATCH ORIGINAL FACTORY FINISH.

VISITING THE SITE:

1. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO BIDDING TO VERIFY ALL EXISTING FIELD CONDITIONS, EQUIPMENT, DIMENSIONS, INTERFERENCES WITH OTHER TRADES, ETC., AND SHALL INCLUDE ALL REQUIRED CHANGES IN HIS BID FOR A COMPLETE OPERATING SYSTEM. BY SUBMITTING A BID, THE CONTRACTOR ACKNOWLEDGES THAT HE HAS VISITED THE JOB SITE, VERIFIED ALL EXISTING FIELD CONDITIONS, AND HAS INCLUDED ALL REQUIRED CHANGES IN HIS BID TO FURNISH AND INSTALL A COMPLETE OPERATING SYSTEM.

COORDINATION:

1. THE CONTRACTOR SHALL COORDINATE ALL VOLTAGES WITH ELECTRICAL CONTRACTOR.
2. ALL AIR OUTLET LOCATIONS SHALL BE COORDINATED IN ACCORDANCE WITH ARCHITECTURAL REFLECTED CEILING PLANS.

PROJECT CLOSEOUT PROCEDURES AND WARRANTY:

1. AT PROJECT CLOSEOUT, THE CONTRACTOR SHALL SUBMIT RECORD DRAWINGS ("AS-BUILT" DRAWINGS) OF INSTALLED DUCTWORK, PIPING, AND EQUIPMENT AS IT WAS ACTUALLY INSTALLED. SUBMIT "AS-BUILT" DRAWINGS AT MINIMUM 1/8" = 1'-0" SCALE. SUBMIT ONE (1) COPY TO ARCHITECT AND ONE (1) TO ENGINEER.
2. THIS CONTRACTOR SHALL PREPARE AND FURNISH TO THE OWNER, TWO BOUND COPIES OF A TYPEWRITTEN LIST OF ALL EQUIPMENT, THE EQUIPMENT MANUFACTURERS OPERATING INSTRUCTIONS, AND A SCHEDULE OF VALVES INSTALLED UNDER THIS CONTRACT. EACH PIECE OF EQUIPMENT LISTED SHALL BE DESCRIBED BY THE DRAWING DESIGNATION NUMBER. THE VALVE SCHEDULE SHALL INDICATE VALVE IDENTIFICATION NUMBER, LOCATION, AND PURPOSE.
3. THIS CONTRACTOR SHALL GUARANTEE HIS WORK TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM DATE OF FINAL CERTIFICATE. ANY REPAIRS OR REPLACEMENT DURING THE PERIOD SHALL BE MADE WITHOUT COST TO THE OWNER, UPON THE OWNER'S REQUEST.

SUBMITTALS:

1. THIS CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL COMPLETE LISTS INCLUDING CATALOG CUTS, ETC., AND WHERE APPLICABLE DIMENSIONED SHOP DRAWINGS OF ALL MATERIALS, FIXTURES AND EQUIPMENT TO BE FURNISHED AND INSTALLED UNDER THIS CONTRACT. INCLUDE SHEETMETAL DUCT LAYOUTS AND PIPING PLAN LAYOUTS. SUBMIT SIX (6) COPIES OF SHOP DRAWINGS FOR REVIEW, DRAWN TO A MINIMUM SCALE OF 1/8" = 1'-0". DO NOT ORDER EQUIPMENT, FABRICATE DUCTWORK OR INSTALL EQUIPMENT, DUCTWORK OR PIPING BEFORE RECEIVING SHOP DRAWINGS REVIEWED BY THE ENGINEER.
2. REQUIRED ITEMS TO BE SUBMITTED SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:
   A. GRILLES / REGISTERS / DIFFUSERS.
   B. MAJOR EQUIPMENT ITEMS: AHUs, MAKE-UP AIR UNITS, ETC.
   C. FANS.
   D. LOUVERS.
   E. PIPING MATERIALS, FITTINGS, AND VALVES.
   F. TEMPERATURE CONTROLS

SCOPE OF WORK:

1. PROVIDE ALL LABOR AND MATERIALS, EQUIPMENT, FACILITIES, TRANSPORTATION AND SERVICES NECESSARY TO FURNISH, INSTALL AND COMPLETE THE HEATING, VENTILATING AND AIR CONDITIONING WORK AS INDICATED ON THE DRAWINGS AND SPECIFIED HERE IN. THE WORKMANSHIP SHALL BE COMPLETE IN EVERY RESPECT, BE TESTED AND APPROVED, AND BE SATISFACTORY TO THE ARCHITECT/ENGINEER AND IN ACCORDANCE WITH THE LOCAL, COUNTY AND STATE LAWS GOVERNING THIS INSTALLATION, INCLUDING THE FIRE MARSHALL.
2. THE DRAWINGS INDICATE DIAGRAMMATICALLY THE EXTENT AND LOCATION OF THE WORK INCLUDED. WORK INDICATED, BUT HAVING MINOR DETAILS OMITTED, SHALL BE PROVIDED, INCLUDING THESE DETAILS, WITHOUT EXTRA COST.
3. INTENT: IT IS THE DECLARED AND ACKNOWLEDGED INTENT OF THESE SPECIFICATIONS TO PROVIDE THE HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS, INCLUSIVE OF ALL REQUIRED PARTS AND ACCESSORIES, COMPLETE AND READY FOR USE AS ITEMIZED, BUT NOT NECESSARILY LIMITED TO THE FOLLOWING:
   A. NATURAL GAS PIPING AND ACCESSORIES.
   B. ALL VENTILATING, HEATING, AND COOLING DUCTWORK.
   C. TOILET EXHAUST FANS WITH ACCESSORIES AND DUCTWORK.
   D. MISCELLANEOUS FANS WITH ACCESSORIES AND DUCTWORK.
   E. KITCHEN EXHAUST FAN WITH ACCESSORIES AND DUCTWORK.
   F. DUCT LINING AND THERMAL INSULATION.
   G. TEST AND BALANCING.
   H. TEMPERATURE CONTROL SYSTEMS.
   I. AIR HANDLING UNIT SYSTEMS.

MECHANICAL IDENTIFICATION:

1. GENERAL: PROVIDE MECHANICAL IDENTIFICATION FOR MECHANICAL EQUIPMENT, PIPING AND DUCT SYSTEMS. COMPLY WITH ANSI A13.1 FOR LETTERING SIZE, LENGTH OF COLOR FIELD, COLORS AND VIEWING ANGLES OF IDENTIFICATION DEVICES. PROVIDE IDENTIFICATIONS PRODUCTS MANUFACTURED BY "SETON" OR APPROVED EQUAL.
2. EQUIPMENT: PROVIDE EQUIPMENT SYSTEM NUMBER, CAPACITY, FLOW RATE, STATIC PRESSURE, PUMP HEAD, ETC.
3. DUCT AND PIPING SYSTEMS: PROVIDE SYSTEM DESIGNATION NAME AND DIRECTION OF FLOW.
4. VALVE TAGS: PROVIDE BRASS VALVE TAGS AND BRASS "S" HOOK FASTENERS WITH VALVE NUMBER AND TYPE OF SERVICE NOTED ON TAG.

CONCRETE BASES, NOISE AND VIBRATION CONTROL:

1. PROVIDE ACOUSTICAL AND VIBRATION ISOLATION TREATMENT TO MAINTAIN NOISE AND VIBRATION LEVELS EQUAL TO OR LESS THAN THOSE INDICATED BY ASHRAE AND ARI 880 AND 885. VIBRATION ISOLATORS SHALL BE SELECTED BY THE MANUFACTURER IN ACCORDANCE WITH THE WEIGHT DISTRIBUTION TO PRODUCE UNIFORM DEFLECTIONS AND TO PREVENT THE TRANSMISSION OF VIBRATION AND MECHANICALLY TRANSMITTED SOUND INTO THE BUILDING STRUCTURE OR OTHER ROOMS.
2. PROVIDE VIBRATION ISOLATORS AND FLEXIBLE CONNECTIONS AS REQUIRED FOR ALL PUMPS, FANS, REFRIGERATION MACHINES, AND OTHER ROTATING COMPONENT EQUIPMENT. PROVIDE AND INSTALL SPRING AND/OR NEOPRENE VIBRATION ISOLATORS. PROVIDE VIBRATION ISOLATION HANGERS WITHIN 50 FEET OF ALL PUMPS, FANS, REFRIGERATION MACHINES, AND OTHER ROTATING COMPONENT EQUIPMENT.

DUCTWORK:

1. DUCT SYSTEM DESIGN, AS INDICATED, HAS BEEN USED TO SELECT SIZE AND TYPE OF AIR-MOVING AND DISTRIBUTION EQUIPMENT AND OTHER AIR SYSTEM COMPONENTS. CHANGES TO LAYOUT OR CONFIGURATION OF DUCT SYSTEM MUST PROVIDE ORIGINAL DESIGN RESULTS WITHOUT INCREASING SYSTEM TOTAL PRESSURE.
2. ALL DUCTWORK SHALL BE PRIME GALVANIZED SHEET STEEL, LOCK FORMING QUALITY. FABRICATE AND REINFORCE DUCTWORK IN ACCORDANCE WITH THE CURRENT EDITION OF SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" AND PER LOCAL CODE.
3. ROUND SPIRAL DUCTWORK SHALL BE UNITED SHEET METAL TYPE DUCT OR APPROVED EQUAL, INSTALLED AND SUSPENDED AS PER MANUFACTURER'S RECOMMENDATIONS.
4. DUCT DIMENSIONS SHOWN ON DRAWINGS ARE INSIDE CLEAR DIMENSIONS. INCREASE DUCT SIZE WHEN LINING IS USED. ALL DUCTWORK SHALL BE COORDINATED WITH CEILING HEIGHTS AS SET FORTH BY ARCHITECT. FLATTEN AND/OR OFFSET DUCTWORK AS PER SMACNA STANDARDS TO MAINTAIN CEILING HEIGHTS.
5. PROVIDE SUPPLY, RETURN AND EXHAUST DIFFUSERS, REGISTERS AND GRILLES AS SCHEDULED ON DRAWINGS. ALL AIR OUTLETS AND INLETS SHALL BE COMPATIBLE WITH THE BUILDING TENANT STANDARDS AND/OR THE ARCHITECTURAL CEILING AND WALL SYSTEMS. ALL AIR OUTLETS AND INLETS SHALL BE PROVIDED WITH FINISHES AS SELECTED BY ARCHITECT. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF ALL AIR OUTLETS AND INLETS.
6. AT THE CONTRACTOR'S OPTION, A 5'-0" MAXIMUM LENGTH OF INSULATED FLEXIBLE DUCT CAN BE PROVIDED TO EACH AIR SUPPLY OUTLET AND RETURN INLET AS REQUIRED (ONE FOOT LONG MAXIMUM LENGTH FOR COMPUTER ROOM UNITS). IF DUCTWORK IS SOUND-LINED, EXTEND RECTANGULAR SOUND-LINED DUCTWORK TO A POINT NEAR THE OUTLET OR INLET SO THAT THE FLEXIBLE DUCT CAN BE ATTACHED TO THE OUTLET OR INLET.
7. PROVIDE TAPERED FITTINGS FOR ALL BRANCH DUCT TAKE-OFFS. PROVIDE TAPERED SPIN-IN FITTING WITH LOCK-IN QUADRANT AND VOLUME DAMPER, FOR LOW PRESSURE DUCTWORK FROM BRANCHES TO DIFFUSERS.
8. PROVIDE VOLUME DAMPERS FOR AIR BALANCING PURPOSES. PROVIDE MANUAL VOLUME DAMPERS ON ALL SUPPLY, RETURN, AND EXHAUST DUCTWORK BRANCHES, AND TO AIR DIFFUSERS, REGISTERS AND GRILLES UNLESS NOTED OTHERWISE. DAMPERS SHALL BE OPPOSED BLADE TYPE UNLESS NOTED OTHERWISE.
9. VOLUME DAMPERS ABOVE ACCESSIBLE CEILINGS: PROVIDE LOCKING LEVER HANDLE AND POSITION INDICATOR, YOUNG REGULATOR 400 SERIES 400 OR EQUIVALENT.
10. VOLUME DAMPERS ABOVE DRYWALL CEILINGS AND OTHER INACCESSIBLE CEILINGS: PROVIDE CONTROL WIRE OR ROD OPERATED DAMPERS WITH LOCKING LEVER HANDLE AND POSITION INDICATOR ENCLOSED IN A CONTROL BOX WITH ADJUSTABLE COVER. YOUNG REGULATOR 315 SERIES 315 OR EQUIVALENT, AND/OR PROVIDE CEILING ACCESS PANELS SIZED AS REQUIRED, 12" X 12" MINIMUM SIZE.
11. PROVIDE TURNING VANES IN ALL 90 DEGREE ELBOWS AND IN OTHER LOCATIONS PER SMACNA HVAC DUCT CONSTRUCTION STANDARDS.
12. CONTRACTOR SHALL PROVIDE ACCESS DOORS AS REQUIRED PER SMACNA, PROVIDE EXTRA ACCESS DOORS AS SHOWN ON THESE PLANS.
13. LOW PRESSURE DUCTWORK SHALL BE CONSIDERED AS ALL DUCTWORK NOT DEFINED AS MEDIUM PRESSURE DUCTWORK, UNLESS NOTED OTHERWISE. PROVIDE 2" S.P. DUCT CONSTRUCTION AND DUCT SEALING FOR SUPPLY AND RETURN AIR AND 1" S.P. DUCT CONSTRUCTION AND DUCT SEALING FOR EXHAUST DUCTWORK UNLESS OTHERWISE NOTED.

VENTILATION AND HYDRONIC PIPING TEST AND BALANCING:

1. TESTING, ADJUSTING, AND BALANCING OF ALL HVAC SYSTEMS SHALL BE PERFORMED BY AN INDEPENDENT TESTING AGENCY WITH QUALIFIED PERSONNEL CERTIFIED BY ASSOCIATED AIR BALANCE COUNCIL (AABC) OR NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). THE HVAC CONTRACTOR SHALL NEGOTIATE A CONTRACT WITH A CERTIFIED MEMBER OF ONE OF THE ABOVE TESTING AGENCIES.
2. AFTER COMPLETION OF ALL REQUIRED WORK, THE CONTRACTOR SHALL OPERATE AND MAKE ANY REQUIRED ADJUSTMENT TO EQUIPMENT, DUCTWORK, VALVES, ETC., AS MAY BE NECESSARY TO PUT THE SYSTEMS IN PROPER OPERATING CONDITION. AFTER ALL ADJUSTMENTS HAVE BEEN COMPLETED, THE CONTRACTOR SHALL BALANCE AIRFLOW AND WATER FLOW, WITHIN DISTRIBUTION SYSTEMS, INCLUDING SUBMAINS, BRANCHES, AND TERMINALS; TO THE INDICATED QUANTITIES ACCORDING TO THE SPECIFIED TOLERANCES.
   A. SUPPLY, RETURN, AND EXHAUST FANS: PLUS 5 TO PLUS 10 PERCENT.
   B. AIR OUTLETS AND INLETS: 0 TO MINUS 10 PERCENT.
3. DURING THE TESTING AND BALANCING, THE CONTRACTOR SHALL VERIFY THAT AUTOMATIC CONTROL DEVICES ARE FUNCTIONING PROPERLY, AND REPORT DEFICIENCIES DISCOVERED BEFORE AND DURING PERFORMANCE OF TESTING, ADJUSTING, AND BALANCING PROCEDURES.
4. SEASONAL PERIODS: PERFORM ADDITIONAL INSPECTIONS, TESTING, AND ADJUSTING DURING NEAR-PEAK SUMMER AND WINTER CONDITIONS.
5. CONTRACTOR SHALL SUBMIT A PROJECT CERTIFICATION GUARANTEE AND CERTIFIED BALANCE REPORT TO ARCHITECT AND ENGINEER BEFORE PROJECT FINAL ACCEPTANCE. THE FINAL TEST RESULTS SHALL BE TABULATED AND FOUR (4) CERTIFIED COPIES SHALL BE SUBMITTED TO THE ARCHITECT FOR APPROVAL.
6. THE TESTING, ADJUSTING, AND BALANCING AGENT SHALL PROVIDE A WRITTEN WARRANTY AGREEING TO PERFORM AT LEAST FOUR (4) INSTANCES OF ADDITIONAL TESTING, ADJUSTING, AND BALANCING, WITHIN 2 YEARS FROM DATE OF SUBSTANTIAL COMPLETION, FOR THE FOLLOWING: AT ARCHITECTS AND/OR BUILDING OWNER'S DISCRETION, VERIFY THAT BALANCED CONDITIONS ARE BEING MAINTAINED THROUGHOUT, TO CORRECT UNUSUAL CONDITIONS, TO PERFORM OWNER REQUESTED ADJUSTMENTS, AND/OR TO MAINTAIN SEASONAL MECHANICAL SYSTEMS PERFORMANCE REQUIREMENTS.

PIPING:

1. GENERAL: ALL PIPING FOR THIS WORK SHALL BE IN CONFORMANCE WITH ASTM STANDARDS. ALL CHANGES IN DIRECTIONS SHALL BE MADE WITH FITTINGS. REAM ALL PIPING AND CLEAN OUT BEFORE ASSEMBLY. PROVIDE VALVES OF SIMILAR MATERIAL AS THE PIPING MATERIAL THEY ARE INSTALLED IN; FERROUS BODY VALVES WITH STEEL PIPING OR BRASS AND BRONZE VALVES WITH COPPER PIPING. PROVIDE DIELECTRIC FITTINGS, UNIONS, ETC. WHERE PIPING, VALVES, FITTINGS, EQUIPMENT, ETC. OF DISSIMILAR METALS ARE JOINED. PROVIDE UNIONS, IN PIPING 2" AND SMALLER, ADJACENT TO EACH VALVE AND AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT. PROVIDE FLANGES, IN PIPING 2-1/2" AND LARGER, ADJACENT TO FLANGED VALVES AND AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT. COVER OPEN PIPING DURING CONSTRUCTION. FLUSH OUT AND CLEAN PIPING IN A MANNER APPROVED BY THE VALVE AND PIPING MANUFACTURERS. FOR EACH BRANCH TAKEOFF, PROVIDE A 3-ELBOW "Z" SHAPE CONNECTION TO PROVIDE PIPING FLEXIBILITY FOR PIPE EXPANSION. PROVIDE GUIDES, ANCHORS, EXPANSION LOOPS, SUPPORTS, VENTS, DRAINS, CONTROLS, ETC. AS REQUIRED.
2. STEEL PIPING SHALL BE SCHEDULE 40, ASTM A 53, UNLESS NOTED OTHERWISE. FITTINGS FOR PIPE 2" AND SMALLER SHALL BE CAST OR MALLEABLE IRON SCREWED FITTINGS, UNLESS NOTED OTHERWISE. ALL PIPING 2-1/2" AND LARGER SHALL BE BUTT WELDED. WELDING SHALL ONLY BE DONE BY WELDERS CERTIFIED FOR THIS WORK. PAINT PIPING EXPOSED OUTSIDE WITH ONE COAT OF RUST-INHIBITING PRIMER AND ONE COAT OF BLACK FINISH PAINT.
3. COPPER PIPING SHALL BE ASTM B 88, TYPE ACR, K, OR L AS INDICATED BELOW. FITTINGS SHALL BE ASTM B 16.22, WROUGHT COPPER.
4. PIPING SYSTEMS AND MATERIALS.
   A. NATURAL GAS PIPING: SCHEDULE 40 STEEL PIPE. FOR PIPE SIZES 2" AND SMALLER, PROVIDE ALL SCREWED AND/OR WELDED PIPING AS REQUIRED BY APPLICABLE BUILDING CODE. FOR PIPE SIZES LARGER THAN 2", PROVIDE ALL WELDED PIPING AS REQUIRED BY APPLICABLE BUILDING CODE. GROUND ALL GAS PIPING. INSTALL DRIP LEGS AND SHUTOFF VALVES IN GAS PIPING BEFORE EACH CONNECTION TO EQUIPMENT. INSTALL VENT PIPING FROM PRV VALVES TO THE OUTDOORS WITH WEATHERPROOF AND INSECT-PROOF OUTDOOR TERMINATION DEVICES. PROVIDE PRESSURE REGULATING VALVE AT ALL EQUIPMENT ITEMS USING NATURAL GAS AT A PRESSURE LESS THAN THE UPSTREAM PIPING PRESSURE. ALL NATURAL GAS PRESSURE REDUCING VALVES SHALL BE VENTED TO THE OUTSIDE OF THE BUILDING.

PIPE INSULATION:

1. FURNISH AND INSTALL INSULATION AS SPECIFIED BELOW. GLASS/MINERAL FIBER INSULATION SHALL COMPLY WITH ASTM C 553 AND ASTM C 1290, FLEXIBLE ELASTOMERIC INSULATION SHALL COMPLY WITH ASTM C 534. FOR INTERIOR PIPING, FURNISH AND INSTALL PVC JACKETING OVER PIPE INSULATION WHERE INSULATION IS SUBJECT TO DAMAGE. FOR EXTERIOR PIPING, FURNISH AND INSTALL ALUMINUM JACKETING OVER PIPE INSULATION.

DUCT INSULATION AND ACOUSTICAL LINING:

1. FURNISH AND INSTALL INSULATION AND/OR LINING WHERE SHOWN ON PLANS OR SPECIFIED BELOW. ALL DUCT SIZES NOTED ON DRAWINGS ARE AIRWAY SIZES WITHOUT SOUND LINING INCLUDED; ADJUST SHEET METAL SIZES ACCORDINGLY.
2. DUCT SOUND LINING:
   A. LOW PRESSURE SUPPLY, EXHAUST/RETURN AND RELIEF AIR DUCTS: SUPPLY DUCTWORK 20 FEET DOWNSTREAM OF SUPPLY FANS, SUPPLY DUCTWORK 15 FEET DOWNSTREAM OF ALL VVT, VAV, AND FAN POWERED VAV TERMINALS, RETURN DUCTWORK 15 FEET UPSTREAM OF RETURN FAN, EXHAUST DUCTWORK 10 FEET UPSTREAM OF EXHAUST FAN. 1" FLEXIBLE GLASS FIBER TYPE, 1.5 PCF DENSITY, SURFACES EXPOSED TO AIR STREAM SHALL BE COATED TO PREVENT EROSION OF GLASS FIBERS.
3. DUCT INSULATION:
   A. ALL SUPPLY DUCTWORK NOT SOUND LINED AND RUN-OUTS TO AIR DIFFUSERS: 1-1/2" FLEXIBLE GLASS FIBER WITH ALL SERVICE VAPOR BARRIER JACKET, MINIMUM 0.75 PCF DENSITY.
   B. ALL RETURN DUCTWORK NOT LINED: 1-1/2" FLEXIBLE GLASS FIBER DUCT WRAP WITH ALL SERVICE VAPOR BARRIER JACKET, MINIMUM 0.75 PCF DENSITY.
   C. SUPPLY AIR, RETURN AIR, MIXED AIR, EXHAUST AIR AND OUTSIDE AIR PLENUMS: 2" SEMI-RIGID GLASS FIBER, 3 LBS. PER CU.FT. DENSITY WITH ALL SERVICE VAPOR BARRIER JACKET.
   D. INSULATED FLEXIBLE DUCT: UL 181, CLASS 1, 2-PLY VINYL FILM, BLACK POLYMER FILM, MULTIPLE LAYERS OF ALUMINUM LAMINATE, OR ALUMINUM LAMINATE AND POLYESTER FILM WITH LATEX ADHESIVE, SUPPORTED BY HELICALLY WOUND, SPRING-STEEL WIRE; FIBROUS-GLASS INSULATION; POLYETHYLENE OR ALUMINIZED VAPOR BARRIER FILM. ALL SUPPLY AND RETURN AIR DUCTWORK CONNECTIONS TO EACH AIR SUPPLY OUTLET AND RETURN INLET: 5' LENGTH MAXIMUM LENGTH.
   E. ALL KITCHEN HOOD EXHAUST DUCTWORK:
      1) FIRE RESISTIVE MINERAL-FIBER INSULATION, LIGHTWEIGHT NON-ASBESTOS, HIGH TEMPERATURE, INORGANIC, CERAMIC FIBER BLANKET TOTALLY ENCAPSULATED IN FOIL/SCRIM HAVING A SERVICE TEMPERATURE RANGE UP TO 2300°F. THE INSULATION SHALL BE UL CLASSIFIED FOR ZERO CLEARANCE WITH A TWO-HOUR FIRE-RATING FOR A GREASE DUCT ENCLOSURE SYSTEM, THERMAL CERAMICS FAST WRAP OR 3M FIRE BARRIER DUCT WRAP. TWO 1-1/2" LAYERS HAVING A TOTAL THICKNESS OF 3 INCHES ARE REQUIRED TO ACHIEVE A TWO-HOUR FIRE-RATING. PROVIDE WATERPROOF ALUMINUM JACKET FOR OUTDOOR INSTALLATION. METAL CORNER BEADS SHALL BE INSTALLED ON ALL EXPOSED DUCTS LESS THAN EIGHT FEET ABOVE FLOOR.
   F. ALL COVERINGS OVER ACCESS PANELS SHALL BE REMOVABLE. MARK KITCHEN HOOD EXHAUST DUCT ACCESS PANELS WITH "ACCESS PANEL, DO NOT OBSTRUCT". METAL CORNER BEADS SHALL BE INSTALLED ON ALL EXPOSED DUCTS LESS THAN EIGHT FEET ABOVE FLOOR.

TEMPERATURE CONTROLS:

1. TEMPERATURE CONTROL WILL BE ELECTRIC AND DDC.
   A. MANUFACTURER: CARRIER
2. PROVIDE 7-DAY PROGRAMMABLE THERMOSTAT. FINAL THERMOSTAT AND SENSOR LOCATIONS SHALL BE COORDINATED WITH THE ARCHITECT AND ENGINEER, BEFORE INSTALLATION.
3. PROVIDE ALL INTERFACE CONNECTIONS AND CONTROL DEVICES REQUIRED BETWEEN FACTORY SUPPLIED CONTROLS OF EQUIPMENT AND THE TEMPERATURE CONTROL CONTRACTOR'S CONTROLS AS REQUIRED IN THE CONTRACT DOCUMENTS SO AS TO FURNISH THE OWNER WITH A COMPLETE AND WORKING TEMPERATURE CONTROL SYSTEM.
4. FINAL THERMOSTAT AND SENSOR LOCATIONS SHALL BE COORDINATED WITH THE ARCHITECT AND ENGINEER, BEFORE INSTALLATION.

CITY OF CHICAGO NOTES:

1. ALL WORK PERFORMED AND EQUIPMENT INSTALLED SHALL CONFORM TO ALL APPLICABLE CHICAGO AND LOCAL CODES.
2. ALL NEW WORK SHALL FOLLOW CHICAGO ENERGY CONSERVATION CODE INCLUDING PIPE INSULATION PER TABLE 18-13-803.3.7 AND DUCT INSULATION PER 18-13-803.2.8.
3. ALL NEW DUCTWORK SHALL BE FABRICATED OF PRIME FIRST QUALITY GALVANIZED SHEET METAL UNLESS NOTED OTHERWISE. CONSTRUCTION METHODS, GAUGES OF METAL, SPACING, ETC. SHALL CONFORM TO THE CURRENT EDITION OF SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE".
4. ALL FLEXIBLE LOW-PRESSURE DUCTWORK SHALL BE INSULATED, CHICAGO APPROVED AND NOT EXCEED 5'-0" IN LENGTH.
5. TRANSFER DUCTS SHALL NOT EXCEED 5'-0" IN LENGTH.
6. THE MECHANICAL CONTRACTOR SHALL VERIFY THAT THE PLENUM CHAMBER USED FOR RECIRCULATION OF AIR WILL BE OF TIGHT CONSTRUCTION AND THAT ALL SOURCES OF AIR CONTAMINANTS FROM TRAPS, SOIL STACKS, DOWNSPOUTS, VENTS, EXHAUST DISCHARGES AND OTHER SOURCES WILL BE ENCLOSED SO THAT NO CONTAMINATED AIR WILL BE RECIRCULATED.
7. OUTSIDE AIR INTAKES SHALL BE 10'-0" ABOVE GRADE AND A MINIMUM OF 15'-0" FROM ALL EXHAUST AIR SOURCES OF CONTAMINATION. MAXIMUM VELOCITY THROUGH OUTSIDE AIR INTAKE LOUVERS AND DUCTWORK SHALL NOT EXCEED 1,000 FPM.
8. ALL REFRIGERATION PIPING SHALL BE TYPE "K" BRAZED RIGID COPPER TUBING.
9. ALL REFRIGERATION VALVES, DEVICES, AND CONNECTIONS SHALL NOT BE LOCATED IN, OR SHALL BE REMOVED FROM THE AIR STREAM OF AIR CONDITIONING UNITS.
10. HEATING SYSTEM IS DESIGNED TO MAINTAIN A MINIMUM OF 72 DEGREES WHEN OUTSIDE AMBIENT TEMPERATURE IS MINUS 10 DEGREES.
11. THE MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL A REFRIGERANT-RELIEF DISCHARGE PIPE FOR EACH REQUIRED REFRIGERATION SYSTEM WITH MORE THAN SIX (6) POUNDS OF REFRIGERANT. THE DISCHARGE PIPE OUTLET SHALL BE INSTALLED A MINIMUM OF 15'-0" ABOVE THE GROUND, A MINIMUM OF 20'-0" FROM ANY OPENING, FIRE ESCAPE, OR EXIT, AND SHALL DISCHARGE THROUGH A TURNED DOWN ELBOW.
12. FOR EACH SYSTEM WITH OVER FOUR (4) POUNDS OF REFRIGERANT, THE MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL A SAFETY RELIEF VALVE DESIGNATED TO RELIEVE AND/OR PREVENT THE BUILD-UP OF EXCESSIVE REFRIGERANT PRESSURE WITHIN EACH DIRECT-EXPANSION SYSTEM. THE PRESSURE RELIEF DEVICE SHALL BE SET AT 400 PSI AND SHALL BE INSTALLED ON THE HIGH TEMPERATURE SIDE AT THE DISCHARGE OF THE COMPRESSOR AND UPSTREAM OF THE COMPRESSOR SHUT-OFF (STOP) VALVE.
13. PROVIDE WELDED 14 GA. BLACK IRON OR WELDED 18 GA. 303 STAINLESS STEEL DUCTWORK FOR KITCHEN HOOD EXHAUST DUCTWORK.
14. ALL EQUIPMENT SHALL HAVE TOTALLY ENCLOSED MOTORS AND BE RATED TO OPERATE IN "PLENUM" CEILINGS.
15. NO CHANGES TO THE EXISTING FAN SYSTEM ARE BEING MADE FOR THE REMODELING WORK.
16. HEAT FOR SPACE IS AN EXISTING SYSTEM WITH NO CHANGES BEING MADE FOR THE REMODELING WORK.
17. THE MAXIMUM SOUND PRESSURE LEVEL, "A-SCALE LEVEL," AT THE PROPERTY LINE BORDERING RESIDENTIAL AREAS SHALL NOT EXCEED 55 dB (A) FOR HVAC EQUIPMENT.
18. THE MAXIMUM SOUND PRESSURE LEVEL, "A-SCALE LEVEL," AT THE PROPERTY LINE BORDERING BUSINESS-COMMERCIAL AREAS SHALL NOT EXCEED 62 dB (A) FOR HVAC EQUIPMENT.
19. ALL FIREPLACE FLUES (PERIMETER CONDOMINIUMS) SHALL BE MADE FROM CLASS 'B' MATERIAL AND EXTEND 6' ABOVE ROOF LINE.

APPROVED EQUAL, CHANGES, AND VOLUNTARY ALTERNATES (VE) ITEMS:

1. APPROVED EQUAL, CHANGE/SUBSTITUTION, AND/OR VOLUNTARY ALTERNATE PROPOSALS: SUBMIT THREE COPIES OF EACH REQUEST TO CONSTRUCTION MANAGER AND/OR ARCHITECT/ENGINEER. IDENTIFY PRODUCTS, FABRICATION, OR INSTALLATION METHODS TO BE REPLACED. INCLUDE DRAWING NUMBERS AND TITLES. SHOW THE FOLLOWING, AS APPLICABLE:
   A. INCLUDE A STATEMENT OUTLINING THE EFFECT ON THE WORK AND REASONS FOR THE APPROVED EQUAL, CHANGE/SUBSTITUTION, AND/OR VOLUNTARY ALTERNATE. INDICATE THE EFFECT ON THE CONTRACT SUM AND THE CONTRACT TIME, AND PROVIDE A COMPLETE DESCRIPTION OF THE PROPOSED APPROVED EQUAL, CHANGE/SUBSTITUTION, AND/OR VOLUNTARY ALTERNATE. ALSO INDICATE ALL ADDITIONAL RESPONSIBILITIES OWNER MUST ASSUME, INCLUDING COMPENSATION TO ARCHITECT/ENGINEER/OTHER CONTRACTORS FOR REDESIGN AND EVALUATION SERVICES, INCREASED COST OF OTHER CONSTRUCTION BY OWNER, ETC.
   B. INCLUDE A LIST OF QUANTITIES OF PRODUCTS REQUIRED OR ELIMINATED AND UNIT COSTS, WITH TOTAL AMOUNT OF PURCHASES AND CREDITS TO BE MADE. INDICATE ALL APPLICABLE COSTS DIRECTLY ATTRIBUTABLE TO THE APPROVED EQUAL, CHANGE/SUBSTITUTION, AND/OR VOLUNTARY ALTERNATE.
   C. INCLUDE COORDINATION INFORMATION, INCLUDING A LIST OF CHANGES OR MODIFICATIONS NEEDED TO OTHER PARTS OF THE WORK AND TO CONSTRUCTION PERFORMED BY OWNER AND SEPARATE CONTRACTORS, THAT WILL BE NECESSARY TO ACCOMMODATE PROPOSED APPROVED EQUAL, CHANGE/SUBSTITUTION, AND/OR VOLUNTARY ALTERNATE. THIS INCLUDES ANY CHANGES TO ELECTRICAL, PLUMBING, STRUCTURAL, BUILDING, ETC., SYSTEMS REQUIRED TO COMPLETE THE WORK.
   D. INCLUDE PRODUCT DATA, INCLUDING DRAWINGS AND DESCRIPTIONS OF PRODUCTS AND FABRICATION AND INSTALLATION PROCEDURES. INCLUDE CONTRACTOR'S CERTIFICATION THAT PROPOSED APPROVED EQUAL, CHANGE/SUBSTITUTION, AND/OR VOLUNTARY ALTERNATE COMPLIES WITH REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IS APPROPRIATE FOR APPLICATIONS INDICATED.
   E. INCLUDE CONTRACTOR'S WAIVER OF RIGHTS TO ADDITIONAL PAYMENT OR TIME THAT MAY SUBSEQUENTLY BECOME NECESSARY BECAUSE OF FAILURE OF PROPOSED APPROVED EQUAL, CHANGE/SUBSTITUTION, AND/OR VOLUNTARY ALTERNATE TO PRODUCE INDICATED RESULTS, OR CHANGES REQUIRED TO THE WORK OF OTHER TRADES.

ALTERNATES:

1. ALTERNATES; SUBMIT INFORMATION FOR EACH ALTERNATE INDICATED ON THE DRAWINGS AND WITHIN THE SPECIFICATIONS. INCLUDE DRAWING NUMBERS AND TITLES. SHOW THE FOLLOWING, AS APPLICABLE:
   A. INCLUDE A STATEMENT OUTLINING THE EFFECT OF THE ALTERNATE ON THE WORK. PROVIDE A COMPLETE DESCRIPTION OF THE PROPOSED ALTERNATE. INDICATE THE EFFECT OF THE PROPOSED ALTERNATE ON THE CONTRACT SUM AND THE CONTRACT TIME.
   B. INCLUDE A LIST OF QUANTITIES OF PRODUCTS REQUIRED OR ELIMINATED AND UNIT COSTS, WITH TOTAL AMOUNT OF PURCHASES AND CREDITS TO BE MADE. INDICATE ALL APPLICABLE COSTS DIRECTLY ATTRIBUTABLE TO THE CHANGE.
   C. INCLUDE COORDINATION INFORMATION, INCLUDING A LIST OF CHANGES OR MODIFICATIONS NEEDED TO OTHER PARTS OF THE WORK AND TO CONSTRUCTION PERFORMED BY OWNER AND SEPARATE CONTRACTORS, THAT WILL BE NECESSARY TO ACCOMMODATE PROPOSED CHANGE. THIS INCLUDES ANY CHANGES TO ELECTRICAL, PLUMBING, STRUCTURAL, BUILDING, ETC., SYSTEMS REQUIRED TO COMPLETE THE WORK.

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	01/08/10	ISSUED FOR PERMIT

PROJECT NUMBER: 09-116
DRAWN BY: LEM
CHECKED BY: JKN

SHEET TITLE:
MECHANICAL SPECS.

SHEET NUMBER:
M1.0

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