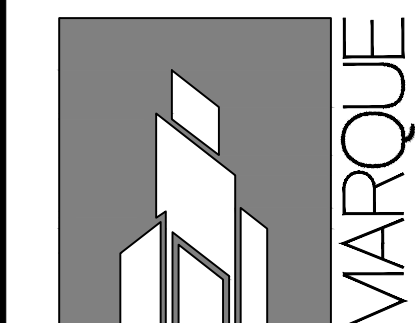




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Revisions:

Mark Date By Description

Issued _____

DIVISION 26 ELECTRICAL SPECIFICATIONS

26 05 01 COMMON REQUIREMENTS FOR ELECTRIC

ALL ELECTRICAL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LATEST EDITION OF NFPA 70 AND ALL REGULATIONS, LAWS, AND ORDINANCES WHICH MAY BE APPLICABLE AND BY TRAINED AND LICENSED ELECTRICIANS.

BEFORE SUBMITTING A BID, EXAMINE DOCUMENTS OF ALL OTHER TRADES, VISIT THE SITE AND GET ACQUAINTED WITH ALL CONDITIONS THAT MAY IN ANY WAY AFFECT THE EXECUTION OF THIS CONTRACT. TAKE MEASUREMENTS AND BE RESPONSIBLE FOR EXACT SIZE AND LOCATIONS OF ALL OPENINGS REQUIRED. VERIFY INSTALLATION MAY BE MADE IN COMPLETE ACCORDANCE WITH ALL PERTINENT CODES AND REGULATIONS. IN THE EVENT OF DISCREPANCY, IMMEDIATELY NOTIFY THE PROFESSIONAL ENGINEER OF RECORD. DO NOT PROCEED WITH THE INSTALLATION IN AREAS OF DISCREPANCY UNTIL ALL SUCH DISCREPANCIES HAVE BEEN FULLY RESOLVED.

IT IS NOT THE INTENT OF THE DRAWINGS THAT EXISTING CONDITIONS BE ACCURATELY SHOWN. EXISTING ELECTRICAL WORK IS SHOWN TO LIMITED EXTENT ON DRAWINGS AND IS SHOWN FOR GENERAL REFERENCE ONLY. LOCATIONS AND INFORMATION WERE DERIVED FROM CURSORY SITE VISUAL OBSERVATIONS OR FROM DOCUMENTS THAT WERE PREPARED FOR PREVIOUSLY INSTALLED WORK WHEN AVAILABLE.

LIST OF EQUIPMENT, TABULATIONS OF DATA, SCHEDULES, ETC. APPEARING IN THE SPECIFICATIONS OR ON THE DRAWINGS ARE INCLUDED FOR REFERENCE BY THE CONTRACTOR IN ARRIVING AT A MORE COMPLETE UNDERSTANDING OF THE INTENDED INSTALLATION. THEY ARE NOT INTENDED OR TO BE CONSTRUED AS RELIEVING THE RESPONSIBILITY OF THE CONTRACTOR IN MAKING HIS/HER OWN TAKE-OFF AND PROVIDING ALL REQUIRED WORK.

THE WORK COVERED BY THESE SPECIFICATIONS SHALL CONSIST OF PROVIDING ALL NEW MATERIAL, LABOR, EQUIPMENT, AND SERVICES NECESSARY FOR A COMPLETE ELECTRICAL INSTALLATION AS SPECIFIED HEREIN. WORK IN THIS SECTION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING ITEMS:

- TELEPHONE CONDUIT SYSTEM
• DATA COMMUNICATIONS CONDUIT SYSTEM
• WIRING DEVICES
• BRANCH CIRCUITING
• GROUNDING
• CONNECTION OF HVAC EQUIPMENT
• TEMPORARY ELECTRICAL WIRING
• LIGHTING

WHENEVER THE WORDS "CONTRACTOR" APPEAR ON ELECTRICAL DRAWINGS OR IN THESE SPECIFICATIONS, IT SHALL REFER TO THE ELECTRICAL SUB-CONTRACTOR. WHENEVER THE WORD "PROVIDE" APPEARS IN THESE DOCUMENTS, IT SHALL BE INTERPRETED TO MEAN "FURNISH AND INSTALL".

COORDINATE ALL WORK WITH THE OWNER TO MINIMIZE INTERRUPTION OF BUILDING OPERATION. SCHEDULE OF ALL POWER OUTGAGES MUST BE APPROVED BY THE OWNER PRIOR TO THE BEGINNING OF ANY WORK.

PRIOR TO ALL WORK, CAREFULLY INSPECT THE INSTALLED WORK OF ALL OTHER TRADES AND VERIFY THAT ALL SUCH WORK IS COMPLETE TO THE POINT WHERE THIS INSTALLATION MAY PROPERLY COMMENCE. COORDINATE THE INSTALLATION OF ELECTRICAL ITEMS WITH THE SCHEDULES FOR WORK OF ALL OTHER TRADES TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

COORDINATE EXACT ELECTRICAL REQUIREMENTS (VOLTAGE, PHASE, AMPS, WIRING, CONNECTIONS, AND ETC.) OF EQUIPMENT FURNISHED BY OTHERS PRIOR TO PERFORMING WORK. COORDINATE MANUFACTURER'S ELECTRICAL WIRING AND CONNECTION REQUIREMENTS WITH PRODUCT DATA AND/OR SUBMITTAL DRAWINGS PRIOR TO ROUGH-IN AND FURNISHING EQUIPMENT'S OVER-CURRENT PROTECTIVE DEVICES. ALL WIRING REQUIREMENTS SHOWN ARE SCHEMATIC IN NATURE.
• COORDINATE SPECIALTY RECEPTACLE AND/OR OUTLET TYPES WITH EQUIPMENT REQUIREMENTS.
• WHEN LOOSE DISCONNECT SWITCHES ARE FURNISHED UNDER MECHANICAL CONTRACT, RECEIVE AND INSTALL AND PROVIDE ALL FINAL TERMINATIONS NECESSARY.

VERIFY ALL EQUIPMENT LOCATIONS, SWITCHES, RECEPTACLES, LIGHTING FIXTURES, ETC., IN FIELD. THE OWNER RESERVES THE RIGHT TO CHANGE LOCATION OF ANY OUTLET OR FIXTURE FOR A DISTANCE OF 15', IN ANY DIRECTION FROM DRAWING LOCATION, BEFORE THE WORK IS ACTUALLY ROUGHED IN, AT NO EXTRA CHARGE.

WHERE LIGHT FIXTURE AND OTHER ELECTRICAL ITEMS ARE SHOWN IN CONFLICT WITH LOCATIONS OF STRUCTURAL MEMBERS AND MECHANICAL OR OTHER EQUIPMENT, PROVIDE ALL REQUIRED SUPPORTS AND WIRING TO CLEAR THE ENCROACHMENT.

PROVIDE ALL MISCELLANEOUS HARDWARE AND MATERIAL NOT SPECIFIED BUT NECESSARY TO PROVIDE A COMPLETE AND WORKING ELECTRICAL SYSTEM. THIS HARDWARE SHALL INCLUDE, BUT NOT BE LIMITED TO, ALL MISCELLANEOUS CONDUIT FITTINGS AND MOUNTING HARDWARE, LUMINAIRE MOUNTING HARDWARE, BRACKETS, CONNECTORS, CORDS AND PLUGS.

PROVIDE ACCESS DOORS TO PROVIDE ACCESS TO ALL J-BOXES, PULL BOXES, AND OTHER EQUIPMENT AS REQUIRED. ACCESS DOORS FOR INSTALLATION IN FIRE RATED CONSTRUCTION SHALL HAVE APPROPRIATE FIRE RATING.

DURING PROGRESS OF THE WORK, MAINTAIN ON DRAWINGS AT THE SITE, AN ACCURATE RECORD OF THE INSTALLATION OF THE ELECTRICAL SYSTEM, INDICATING ALL ITEMS WHICH HAVE BEEN CHANGED OR ADDED.

APPLY FOR AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED BY LOCAL AUTHORITY, FOR THE APPROVAL OF WORK.

A CERTIFICATE OF FINAL INSPECTION AND APPROVAL SHALL BE SUBMITTED WITH THE CONTRACTOR'S REQUEST FOR FINAL PAYMENT. NO FINAL PAYMENT WILL BE APPROVED WITHOUT THIS CERTIFICATE.

GUARANTEE ALL WORKMANSHIP, MATERIAL, AND EQUIPMENT AND REPLACE ANY FOUND DEFECTIVE WORK WITHOUT COST TO THE OWNER, FOR A PERIOD OF ONE YEAR AFTER FINAL ACCEPTANCE.

ADDITIONAL WORK REQUIRED FOR COMMERCIAL KITCHENS, WHETHER OR NOT EXPLICITLY LISTED ON A CASE BY CASE BASIS ON PLANS:

ALL 15 AND 20 AMP, 125 VOLT RATED RECEPTACLES IN KITCHENS AND/OR WITHIN 6'-0" OF A WATER SOURCE MUST HAVE GFCI PROTECTION. PROVIDE GFCI RECEPTACLES IN READILY ACCESSIBLE LOCATION. WHERE ELECTRIC PANEL IS IN READILY ACCESSIBLE LOCATION, GFCI CIRCUIT BREAKERS MAY BE UTILIZED IN PLACE OF GFCI RECEPTACLES AT THE CONTRACTOR'S DISCRETION.

HARD WIRED EQUIPMENT ON PLAN IS SHOWN DIRECTLY CONNECTED WITH DISCONNECTING MEANS PER THE PROVISIONS OF NFPA 70, SECTION 422.34. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO COORDINATE WITH FINAL EQUIPMENT SELECTIONS. IF NO UNIT SWITCH WITH A MARKED-OFF POSITION IS INTEGRAL TO THE APPLIANCE BEING SERVED, PROVIDE GENERAL PURPOSE LOCAL DISCONNECT SWITCH SUITABLE FOR THE VOLTAGE, AMPERAGE AND PHASE OF THE APPLIANCE.

ALL MATERIALS, APPARATUS AND EQUIPMENT SHALL BEAR THE SEAL OF UNDERWRITERS LABORATORIES INC. (UL) OR A SIMILAR CREDIBLE TESTING AGENCY. DESIGN BASIS MANUFACTURERS OF MATERIAL AND EQUIPMENT ARE SPECIFIED AND PLANS ARE DETAILED ACCORDING TO THIS MATERIAL. CONTRACTOR SHALL BASE HIS BID ON FURNISHING AND INSTALLING THIS MAKE OF MATERIAL AND EQUIPMENT.

AN ACCEPTABLE MANUFACTURER'S NAME AND MODEL NUMBER OF A PRODUCT MAY BE PROVIDED IN THESE DOCUMENTS. THIS IS THE EQUIPMENT INCLUDED DURING THE DESIGN PROCESS AND FORMS THE BASIS OF A STANDARD OF QUALITY. WHERE MORE THAN ONE MAKE OF MATERIAL OR EQUIPMENT IS SPECIFIED, THE CONTRACTOR SHALL STATE IN HIS BID WHICH MAKE HE PROPOSES TO FURNISH AND INSTALL. SHOP DRAWING APPROVAL SHALL BE OBTAINED PRIOR TO SHIPMENT OF EQUIPMENT.

VERIFY THE MODEL NUMBER OR PRODUCT IS STILL ACCURATE AND MEETS ALL REQUIREMENTS SHOWN ON THE DRAWINGS. IF THERE IS A DISCREPANCY BETWEEN THE REQUIREMENTS AND THE PRODUCT OR MODEL NUMBER, THE STRICTER OF THE TWO SHALL GOVERN.

IF ANY EXISTING CODE OR SAFETY VIOLATIONS ARE DISCOVERED BY THE ELECTRICAL CONTRACTOR, THEY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION (DETAILED IN WRITING) OF THE OWNER'S REPRESENTATIVE ALONG WITH THE CONTRACTOR'S PROPOSED COST FOR CORRECTIONS.

26 05 03 SUBMITTALS FOR ELECTRICAL SYSTEMS

SUBMIT SHOP DRAWINGS AND/OR PRODUCT DATA (ELECTRONIC COPIES) ON THE FOLLOWING ITEMS FOR REVIEW BEFORE FABRICATION OR SHIPMENT:

- PANEL BOARDS AND CIRCUIT BREAKERS
• DISCONNECT SWITCHES
• WIRING DEVICES
• LIGHTING
• LIGHTING CONTROLS (SWITCHES - TOGGLE, DIMMER, OCCUPANT SENSORS, ETC.)

MAINTENANCE MANUALS: THE MANUALS SHALL INCLUDE WIRING DIAGRAMS, MAINTENANCE AND OPERATING INSTRUCTIONS, PARTS LISTINGS, AND COPIES OF OTHER SUBMITTALS INDICATED FOR INCLUSION.

REVIEW AND CORRECTIONS OR COMMENTS MADE ON SHOP DRAWINGS, PRODUCT DATA: CATALOGS, CUT SHEETS, CHARTS, AND OTHER ITEMS DURING CONSTRUCTION PHASE SUBMITTAL REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE CONTRACT DOCUMENTS, FOR PROVIDING A COMPLETE AND FUNCTIONING PROJECT, NOR SHALL THEY RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR DEVIATIONS OR ERRORS OF ANY SORT. THIS REVIEW IS FOR THE LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH INFORMATION GIVEN AND THE DESIGN CONCEPT EXPRESSED IN THE CONTRACT DOCUMENTS. CONTRACTOR REMAINS RESPONSIBLE FOR DETERMINING THE ACCURACY AND COMPLETENESS OF OTHER DETAILS SUCH AS DIMENSIONS AND QUANTITIES. FOR SUBSTANTIATING INSTRUCTIONS FOR INSTALLATIONS, VERIFYING MATERIALS REQUIRED, OBTAINING FIELD MEASUREMENTS AND RELATED CRITERIA, COORDINATING WORK WITH OTHER DISCIPLINES AND PERFORMING WORK IN COMPLIANCE WITH THE CONTRACT DOCUMENTS.

ANY CHANGES TO ITEMS SPECIFIED MUST BE SUBMITTED IN WRITING AS A SUBSTITUTION, WITH COMPLETE DOCUMENTATION OF PRICE DIFFERENTIAL AND EQUIPMENT DETAILS. SUBSTITUTIONS PROVIDED SHALL BE REVIEWED AT MARQUE ENGINEERING'S HOURLY RATES. REVIEW SHALL BE PAID FOR BY THE CONTRACTOR TO MARQUE ENGINEERING AT NO COST TO THE OWNER. BY USING PRE-APPROVED SUBSTITUTIONS, THE CONTRACTOR ACCEPTS ALL RESPONSIBILITY AND ASSOCIATED COSTS FOR ALL REQUIRED MODIFICATIONS TO THE CONTRACT DOCUMENTS TO INCLUDE BUT NOT LIMITED TO MATERIAL OR EQUIPMENT COSTS FOR THEIR OR OTHER TRADES, AND ENSURING THAT SUBSTITUTED MATERIALS AND EQUIPMENT TO BE FURNISHED FIT INTO SPACE AVAILABLE.

EXTENSIVE REVISIONS NECESSITATED TO THE CONTRACT DOCUMENTS, OR SUBSTITUTION ACTIONS RELATED TO ANY SPECIFIED PRODUCT NOT ABLE TO BE PROVIDED DUE TO A FAILURE TO COMMENCE WORK, PROCURE PRODUCT OR COORDINATE CONSTRUCTION ACTIVITIES SHALL BE PROVIDED AT MARQUE ENGINEERING'S HOURLY RATES. COSTS SHALL BE BORNE BY THE CONTRACTOR AT NO COST TO THE OWNER.

26 05 19 LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

FURNISH AND INSTALL ALL NECESSARY CABLE OF THE SIZE AND TYPE INDICATED ON THE DRAWINGS. ALL WIRE SHALL BE COPPER UNLESS OTHERWISE SPECIFIED.

NO CONDUCTOR SMALLER THAN NO. 12 AWG SHALL BE USED UNLESS OTHERWISE INDICATED. IN GENERAL, CONDUCTORS SMALLER THAN NO. 12 WILL BE PERMITTED ONLY FOR COMMUNICATION, SIGNAL, OR CONTROL CIRCUITS.

PROVIDE THE FOLLOWING MINIMUM AWG CONDUCTOR SIZES FOR GENERAL BRANCH CIRCUITING AND GROUNDS THAT ARE NOT INDICATED ON DRAWINGS. ALL WIRING IS BASED ON USING COPPER CONDUCTORS UNLESS OTHERWISE INDICATED. WHERE APPLICABLE INCREASE AS REQUIRED TO ACCOMMODATE VOLTAGE DROP AND TO ACCOMMODATE SPECIAL CONDITIONS. DO NOT DERATE ANY GROUNDING (NEUTRAL) CONDUCTORS. TEMPERATURE RATINGS LISTED BELOW PERTAIN TO BOTH WIRE AND TERMINATIONS.

Table with 3 columns: SOURCE BREAKER/FUSE, 60 DEG. C RATING, EQUIPMENT GROUNDING. Rows list AWG wire sizes for various amperage ratings from 15 AMPERE to 100 AMPERE.

CONDUCTORS SHALL BE CONTINUOUS FROM OUTLET TO OUTLET, NO SPLICES SHALL BE PERMITTED EXCEPT AT OUTLETS. ALL ELECTRICAL CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH NEC.

COLOR CODING IS REQUIRED FOR ALL SERVICE, FEEDER, BRANCH, CONTROL, AND SIGNALING CIRCUIT CONDUCTORS. INSULATION COLOR FOR NEUTRALS SHALL BE WHITE FOR 120 VOLT CIRCUITS. EQUIPMENT GROUNDING CONDUCTORS SHALL BE GREEN. THE COLOR OF THE INSULATION OF THE UNGROUNDED CONDUCTORS SHALL BE AS FOLLOWS:

208Y/120V SYSTEM: BLACK, RED, BLUE AND WHITE (NEUTRAL)
480Y/277V SYSTEM: BROWN, ORANGE, YELLOW AND GRAY (NEUTRAL)
EQUIPMENT GROUNDING: GREEN

ALL UNGROUNDED CONDUCTORS OF THE SAME COLOR SHALL BE CONNECTED TO THE SAME UNGROUNDED FEEDER CONDUCTOR. USE NO WIRE SMALLER THAN NO. 12 AWG. RATED AT 600 VOLTS. FOR POWER AND LIGHTING CIRCUITS AND NO SMALLER THAN NO. 14 FOR CONTROL WIRING. BRANCH CIRCUIT CONDUCTORS FOR 20 AMPERE, 120 VOLT CIRCUITS SHALL BE NO. 12 AWG, WITH CONDUCTOR FROM PANEL BOARD TO THE FIRST OUTLET AS FOLLOWS:

0 - 75 FEET-----#12 AWG
75 - 150 FEET-----#10 AWG
150-250 FEET-----#8 AWG
250-350 FEET-----#6 AWG

ALL JOINTS AND SPLICES SHALL BE MADE MECHANICALLY AND ELECTRICALLY SECURE. ALL SPLICES AND JOINTS SHALL BE MADE WITH APPROVED SOLDERLESS CONNECTORS, PROPERLY INSTALLED.

TYPE MC CABLE MAY BE USED FOR SHORT (LESS THAN 6 FEET) FINAL CONNECTIONS ONLY.

26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

ALL WIRE FOR GROUNDING PURPOSE SHALL BE STRANDED COPPER, OR COPPER CLAD STEEL AS REQUIRED FOR TYPE AND SIZES INDICATED ON DRAWINGS.

BUILDING ELECTRODE GROUND RODS SHALL BE 1/2" DIA LONG X 3/4" DIAMETER (MINIMUM DIMENSIONS). GROUND RODS SHALL BE STEEL WITH A MOLECULARLY BONDED OUTER LAYER OF ELECTROLYTICALLY APPLIED COPPER JACKET OF GALVANIZED STEEL AS REQUIRED. ALL GROUND RODS SHALL BE TESTED WITH PROPER TEST EQUIPMENT FOR ROD TO EARTH RESISTANCE BEFORE CONNECTING GROUND WIRE.

METAL RACEWAYS MAY NOT BE USED FOR EQUIPMENT GROUNDING CONDUCTOR.

PROVIDE A SEPARATE DRIVEN GROUND FOR THE NEUTRAL BUSS ON THE ELECTRICAL DISTRIBUTION SYSTEM.

PROVIDE A SEPARATE DRIVEN GROUND FOR USE AS EQUIPMENT GROUND. THE DRIVEN GROUND TO INCOMING CITY WATER LINE THROUGH A #4/0 BAR STRANDED COPPER CONDUCTOR. USE APPROVED GROUND CLAMPS.

PROPERLY GROUND ALL MOTORS, TRANSFORMERS, EQUIPMENT, CONDUITS, SWITCH GEAR, ETC.

GROUND ALL LUMINAIRES BY INSTALLING A SEPARATE GREEN GROUND WIRE IN ANY FLEXIBLE CONDUIT BETWEEN OUTLET BOX AND FIXTURE.

26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

CONDUIT SHALL BE SUPPORTED BY APPROVED STRAPS, FASTENERS AND HANGERS. HANGERS SHALL BE SUSPENDED FROM RODS. PERFORATED STRAPS WILL NOT BE ACCEPTABLE. FASTENERS SHALL BE LEAD EXPANSION SHIELDS IN BLOCK OR CONCRETE, TOGGLE BOLTS IN HOLLOW WALLS, MACHINE SCREWS ON METAL SURFACES AND WOOD SCREWS ON WOOD CONSTRUCTION.

ALL CONDUIT SHALL BE SUPPORTED INDEPENDENTLY FROM ALL OTHER BUILDING SYSTEMS AND SHALL BE SUPPORTED DIRECTLY FROM STRUCTURAL COMPONENTS. AT BUILDING EXPANSION JOINTS AND WHERE DEFLECTION IS EXPECTED, CONDUITS SHALL BE PROVIDED WITH EXPANSION FITTINGS WITH BONDING JUMPERS. CONDUITS PASSING THROUGH STRUCTURAL MEMBERS SHALL BE PROVIDED WITH STUB AND COUPLING OR SLEEVE IN THE MEMBER. WHERE MOISTURE CONDITIONS ARE ENCOUNTERED, A HOLE SHALL BE DRILLED AT THE LOWEST POINT IN THE CONDUIT RUN.

26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

CONCEAL CONDUIT AND EMT WITHIN FURNISHED WALLS, CEILINGS, AND FLOORS UNLESS OTHERWISE INDICATED. INSTALL CONDUITS PARALLEL OR PERPENDICULAR TO BUILDING LINES.

INTERIOR CONDUIT SHALL BE OF SUFFICIENT SIZE AND INSTALLED SO THE REQUIRED NUMBER OR CONDUCTORS CAN BE INSERTED OR REMOVED WITHOUT INJURY TO, OR EXCESSIVE STRAIN UPON, THE INSULATION. THE MINIMUM CONDUIT SIZE SHALL BE 3/4" UNLESS OTHERWISE NOTED.

CONDUITS SHALL BE RUN CONTINUOUS FROM OUTLET TO OUTLET AND SHALL BE FASTENED TO ALL BOXES AND CABINETS WITH DOUBLE LOCKOUTS, TO PROVIDE CONTINUITY OF GROUND, AND A BUSHING. THE FULL NUMBER OF THREADS MUST PROJECT BEYOND LOCKOUT IN BOXES AND CABINETS TO ALLOW THE BUSHING TO BUTT UP TIGHT AGAINST THE END OF THE CONDUIT.

CONDUIT RUN EXPOSED SHALL RUN PARALLEL OR PERPENDICULAR TO WALLS, CEILINGS, OR PRINCIPAL FRAMING MEMBERS. IT IS REQUIRED THAT ALL CONDUIT BE INSTALLED TO REFLECT NEAT, CAREFUL WORKMANSHIP THROUGHOUT THE JOB. CONDUIT WHICH HAS BEEN CRUSHED, DAMAGED, OR DEFORMED IN ANY WAY SHALL NOT BE INSTALLED IN THE JOB. CONDUIT SHALL BE INSTALLED IN SUCH A MANNER AS TO INSURE AGAINST TROUBLE FROM COLLECTION OF TRAPPED CONDENSATE, AND ALL RUNS OF CONDUIT SHALL BE FREE OF SUCH TRAPS WHEREVER POSSIBLE.

ALL CONDUIT HANGERS AND SUPPORTS SHALL BE RIGIDLY FASTENED TO THE BUILDING STRUCTURE. NO CONDUIT SHALL BE SUPPORTED FROM DUCTWORK, PIPING, OR CEILING GRID SYSTEMS.

PROVIDE FIRE SEALS WHEREVER CONDUIT PENETRATES FIRE WALLS, CEILING OR RATED FLOOR SLABS.

RIGID STEEL CONDUIT SHALL BE USED FOR ALL CONDUIT RUNS INSTALLED IN CONCRETE SLABS, IN ALL POURED CONCRETE CONSTRUCTION AND ALL APPLICATIONS INSIDE BUILDING REQUIRING 2" OR LARGER IN SIZE. CONDUIT SHALL BE SUPPORTED AT INTERVALS NOT TO EXCEED 7 FEET FOR 3/4" CONDUIT, 8 FEET INTERVALS FOR CONDUIT ON 1" TO AND INCLUDING 2", AND 10 FEET FOR CONDUITS 2-1/2" OR LARGER.

RIGID CONDUIT (ALUMINIUM) SHALL NOT BE INSTALLED IN POURED CONCRETE. ALUMINIUM CONDUIT MAY BE USED FOR SWITCH LEGS AND BRANCH CIRCUITS IN PARTITIONS, ABOVE CEILING, AND WHERE CONDUIT RUN IS EXPOSED. CONDUIT SHALL BE SUPPORTED AT INTERVALS NOT TO EXCEED 7 FEET FOR 3/4" CONDUIT, 8 FEET INTERVALS FOR CONDUIT 1" TO AND INCLUDING 2", AND 10 FEET FOR CONDUITS 2-1/2" OR LARGER.

ELECTRICAL METALLIC TUBING (THIN WALL) MAY BE USED FOR SWITCH LEGS (EXCEPT IN POURED CONCRETE WALLS) AND BRANCH CIRCUITS IN PARTITIONS, ABOVE CEILINGS, AND WHERE CONDUIT RUN IS EXPOSED. CONDUIT SHALL BE SUPPORTED AT INTERVALS NOT TO EXCEED 7 FEET FOR 3/4" CONDUIT, 8 FEET INTERVALS FOR CONDUIT 1" TO AND INCLUDING 1-1/2". EMT LARGER THAN 1-1/2" WILL NOT BE PERMITTED.

PLASTIC CONDUIT (PVC): PLASTIC CONDUIT MAY BE USED FOR UNDERGROUND CONDUIT RUNS OUTSIDE BUILDING AND BELOW FLOOR SLAB. UNDERGROUND CONDUIT RUNS OUTSIDE BUILDING SHALL BE A MINIMUM OF 2'-6" BELOW GRADE. CONDUIT RUN BELOW FLOOR SLAB SHALL BE A MINIMUM OF 12" BELOW FLOOR SLAB.

FLEXIBLE CONDUIT SHALL BE USED BETWEEN OUTLET BOXES IN HUNG OR FURRED CEILINGS AND RECESSED LIGHTING FIXTURES. FLEXIBLE CONDUIT SHALL NOT EXCEED 6 FEET IN LENGTH.

LIQUID TIGHT FLEXIBLE CONDUIT SHALL BE USED FOR FINAL CONNECTIONS TO ALL MOTORS. LIQUID TIGHT FLEXIBLE CONDUIT SHALL BE USED FOR FINAL CONNECTIONS TO ALL MOTORS OR DEVICES WHICH DO OR MAY VIBRATE. LIQUID TIGHT FLEXIBLE CONDUIT SHALL NOT EXCEED 3 FEET IN LENGTH.

PROVIDE SEALING BUSHINGS IN ALL UNDERGROUND CONDUITS AS REQUIRED TO PREVENT THE ENTRY OF MOISTURE INTO ELECTRICAL EQUIPMENT.

PROVIDE CONDUIT EXPANSION FITTINGS WHERE CONDUIT CROSSES A BUILDING EXPANSION JOINT, AND IN ALL STRAIGHT CONDUIT RUNS 200 FEET OR LONGER.

ALL OUTLET, SWITCH, JUNCTION AND PULL BOXES SHALL BE MADE OF CODE GALVANIZED STEEL COMPLETE WITH RINGS AND SCREW COVER PLATES AND LOCATED WHERE SHOWN AND NOTED ON DRAWINGS. WHERE CONDUIT IS CONCEALED, BOXES SHALL NOT BE LESS THAN 4" SQUARE X 1-1/2" DEEP. ALL BOXES SHALL BE EQUIPPED WITH PROPER COVERS TO BRING FLUSH WITH FINISHED WALL SURFACE.

USE GANG BOXES WHERE MORE THAN ONE DEVICE IS TO BE INSTALLED AT THE SAME LOCATION.

ALL BOXES FOR CONCRETE WORK SHALL BE OF TYPE ESPECIALLY DESIGNED FOR INSTALLATION IN CONCRETE.

PROVIDE OUTLET BOX ACCESSORIES AS REQUIRED FOR EACH INSTALLATION, INCLUDING MOUNTING BRACKETS, WALLBOARD HANGERS, EXTENSION RINGS, FIXTURE STUDS, CABLE CLAMPS, AND METAL STRAPS FOR SUPPORTING OUTLET BOXES, COMPATIBLE WITH OUTLET BOXES BEING USED AND MEETING REQUIREMENTS OF INDIVIDUAL WIRING SITUATIONS.

PULL BOXES (NOT SHOWN ON THE CONTRACT DRAWINGS) SHALL BE INSTALLED AS REQUIRED TO FACILITATE PULLING OF CONDUCTORS ON LONG RUNS. PULL BOXES LOCATED IN FLOORS SHALL BE FLUSH WITH FINISHED FLOOR, AND OF CAST WROUGHT IRON, ALUMINIUM, OR BRONZE WITH SEALED WATERPROOF COVER. CONDUIT ENTRANCES SHALL BE THREADED.

PROVIDE CORROSION RESISTANT CAST METAL WEATHERPROOF OUTLET WIRING BOXES, OF THE TYPE, SHAPE, AND SIZE CAPABLE FOR EACH APPLICATION. WITH THESE AND AIR CONDITIONING EQUIPMENT FULLY OPERATIONAL AND FULLY COMPLIANT WITH ALL LOCAL AND NATIONAL CODES. THIS INCLUDES, PRIOR TO ORDERING MATERIALS OR COMMENCING WITH ROUGH-IN, REVIEWING EQUIPMENT SUBMITTAL DATA AND COORDINATING WITH INSTALLING CONTRACTORS TO ENSURE THE CORRECT SIZE, RATING AND QUANTITY OF CONDUCTORS ARE PROVIDED.

PROVIDE WATERPROOF OUTLETS FOR INTERIOR AND EXTERIOR LOCATIONS EXPOSED TO WEATHER OR SUBJECT TO FREQUENT WASHING.

SECURE BOXES RIGIDLY TO THE SUBSTRATE UPON WHICH THEY ARE BEING MOUNTED, OR SOLIDLY EMBED BOXES IN CONCRETE OR MASONRY.

26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS

PROVIDE MANUFACTURERS STANDARD SELF-ADHESIVE VINYL TAPE NOT LESS THAN 3 MILS THICK BY 1-1/2" WIDE. INSTALL ON ALL CONCEALED RACEWAYS AT CONNECTION TO ALL JUNCTION BOXES, PULL BOXES, EQUIPMENT, WALL/FLOOR/ROOF PENETRATIONS, ETC.

PROVIDE CIRCUIT IDENTIFICATION BANDS FOR ALL CABLES AND CONDUCTORS. PROVIDE ON ALL CONDUCTORS OF ALL SYSTEMS.

INSTALL ENGRAVED PLASTIC-LAMINATE SIGN ON ELECTRICAL EQUIPMENT, INCLUDING PANELBOARDS, DISCONNECTS, STARTERS, CONTROL PANELS, ETC. PROVIDE SINGLE LINE OF TEXT, 1/2" HIGH LETTERING, ON 1-1/2" HIGH SIGN (2" HIGH WHERE 2 LINES ARE REQUIRED), WHITE LETTERING IN BLACK FIELD.

26 05 84 MECHANICAL EQUIPMENT

PROVIDE ALL NECESSARY ELECTRICALLY RELATED WORK AS REQUIRED TO RENDER ALL MECHANICAL EQUIPMENT (INCLUDING PLUMBING, HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT) FULLY OPERATIONAL AND FULLY COMPLIANT WITH ALL LOCAL AND NATIONAL CODES. THIS INCLUDES, PRIOR TO ORDERING MATERIALS OR COMMENCING WITH ROUGH-IN, REVIEWING EQUIPMENT SUBMITTAL DATA AND COORDINATING WITH INSTALLING CONTRACTORS TO ENSURE THE CORRECT SIZE, RATING AND QUANTITY OF CONDUCTORS ARE PROVIDED.

26 24 16 PANELBOARDS

PROVIDE PANEL BOARDS AS SHOWN ON THE DRAWINGS. PANEL BOARDS SHALL BE DEAD FRONT EQUIPPED WITH THERMAL MAGNETIC MOLDED CASE CIRCUIT BREAKERS, OF FRAME AND TRIP RATINGS AS SHOWN ON THE PANEL BOARDS SCHEDULE. PANEL BOARDS SHALL BE MANUFACTURED IN ACCORDANCE WITH THE LATEST NEMA STANDARDS AND SHALL BE LISTED BY UL AND BEAR UL LABEL. ALL PANEL BOARDS SHALL BE OF ONE MANUFACTURER.

PANELBOARDS, MAIN BUSS, MAIN LUGS, AND/OR MAIN BREAKER SHALL BE RATED AS NOTED ON PANEL BOARD SCHEDULES. CURRENT DENSITY SHALL BE IN ACCORDANCE WITH UL REQUIREMENTS. BUSS MOUNTING FOR CIRCUIT BREAKERS SHALL BE BOLTED CONNECTIONS AND ACCOMMODATE ANY COMBINATION OF CIRCUIT BREAKER UNITS WITHOUT FURTHER MODIFICATIONS. THE COMPLETE PANEL BOARD, INCLUDING MAIN CIRCUIT BREAKER, BUSS AND LUGS, BRANCH CIRCUIT BREAKERS, AND CONNECTION SHALL BE PROPERLY DESIGNED AND UL LISTED TO WITHSTAND THE EFFECT OF THE AVAILABLE REQUIRED SHORT CIRCUIT CURRENT.

MATERIALS: ALL PANEL BOARDS SHALL BE MOUNTED IN CODE GAUGE GALVANIZED STEEL CABINETS, HAVING HINGED DOOR EACH DOOR SHALL BE EQUIPPED WITH A LATCH AND LOCK. ALL LOCKS ON ALL PANEL BOARD CABINET DOORS ON THIS PROJECT SHALL ACCEPT A COMMON KEY. FURNISH TWO KEYS WITH EACH LOCK.

FOR DETAILS CONCERNING THE NUMBER AND SIZE OF CIRCUIT BREAKERS, SIZE OF MAINS, SIZE AND LOCATION OF LUGS, AND WHETHER SURFACE OR FLUSH MOUNTED, REFER TO PROJECT PANEL BOARD SCHEDULES ON THE CONTRACT DRAWINGS.

CABINET SHALL BE SIZED TO PROVIDE WIRING GUTTERS AT SIDES, TOP AND BOTTOM TO ACCOMMODATE THE NECESSARY CONDUCTORS WITHOUT CROWDING.

PROVIDE ON THE INSIDE OF THE DOOR FACE OF EACH PANEL BOARD CABINET, AN ACCURATE TYPEWRITTEN CIRCUIT DIRECTORY PROTECTED BY GLASS OR CLEAR PLASTIC. HANDWRITTEN OR HAND PRINTED DIRECTORIES WILL NOT BE ACCEPTED. THE CONTRACTOR IS INSTRUCTED THAT THE FINAL TYPED DIRECTORY SHALL BE MADE AFTER THE PERMANENT ROOM NUMBERS ARE INSTALLED ON THE DOORS, AND THE DIRECTORIES SHALL LIST THESE NUMBERS RATHER THAN THE ROOM NUMBERS USED ON THE CONSTRUCTION DRAWINGS.

ALL PANEL BOARDS SHALL HAVE ENGRAVED NAME TAGS ATTACHED TO COVER INDICATING PANEL NUMBER AND VOLTAGE.

ANCHOR ENCLOSURES FIRMLY TO WALLS AND STRUCTURAL SURFACES, ENSURING THAT THEY ARE PERMANENTLY AND MECHANICALLY SECURED.

INSTALL ALL PANEL BOARDS WITH THE TOP 6'-6" ABOVE FINISHED FLOOR.

DISTRIBUTION PANEL BRANCH BREAKERS SHALL BE SELECTED TO PROVIDE SERIES RATING AS NECESSARY FOR AVAILABLE FAULT CURRENT.

ACCEPTABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING: SCHNEIDER ELECTRIC, EATON, GE BY ABB, OR SIEMENS.

26 27 26 WIRING DEVICES

ALL WIRING DEVICES SHALL BE UL LISTED, COMMERCIAL SPECIFICATION GRADE.

SWITCHES IN THE SAME LOCATION SHALL BE GANGED BEHIND A SINGLE PLATE.

DEVICE PLATES IN THE COMMERCIAL FOOD SERVICE AND/OR KITCHEN AREA SHALL BE METAL, ALUMINIUM OR STAINLESS.

DEVICES IN RESTAURANT DINING AREA(S) SHALL BE TAMPER RESISTANT, AND THERMOPLASTIC (NYLON) OR METAL, COLOR AS APPROVED BY BRAND, OR ARCHITECT OF RECORD. APPROVED MANUFACTURER OF SWITCHES AND RECEPTACLES ARE HUBBELL, ARROW HARTY, BRYANT, LEVITON, PASS & SEYMOUR, GE BY ABB, SLATER OR EQUAL.

DUPLEX RECEPTACLES SHALL BE 20 AMP, 125 VOLT, 3 WIRE GROUNDING TYPE. PROVIDE SMOOTH THERMOPLASTIC COVER PLATE AND MATCHING SCREWS. DEVICES AND COVER PLATE SHALL MATCH ADJACENT ARCHITECTURAL FINISHES UNLESS SPECIFICALLY NOTED OTHERWISE. APPROVED PRODUCTS: HUBBELL, LEVITON, BRYANT OR EQUAL.

WEATHERPROOF RECEPTACLES SHALL BE DUPLEX, 20 AMP, 125 VOLT, GROUND FAULT 3 WIRE GROUNDING TYPE WITH WEATHERPROOF COVER. APPROVED PRODUCTS: HUBBELL, LEVITON, BRYANT OR EQUAL.

USB RECEPTACLES SHALL BE DUPLEX, 20 AMP, 125 VOLT, GROUND FAULT 3 WIRE GROUNDING TYPE WITH TWO VERTICAL USB PORTS WITH A MINIMUM OF 3.6A CHARGING CAPACITY AND TWO 20A RATED OUTLETS. APPROVED PRODUCTS: HUBBELL, LEVITON, BRYANT OR EQUAL.

WALL SWITCHES SHALL BE 20 AMP, 120-277 VOLT, QUIET, HIGH CAPACITY, TOGGLE TYPE. SINGLE POLE SWITCHES - APPROVED PRODUCTS ARE HUBBELL, LEVITON, BRYANT OR EQUAL. THREE-WAY SWITCHES - APPROVED PRODUCTS HUBBELL, LEVITON, BRYANT OR EQUAL.

DIMMER SWITCHES SHALL BE COMPATIBLE WITH LIGHTING TO BE CONTROLLED (I.E. - 120V LINE OR 0-10V LOW VOLTAGE) AND SHALL BE RATED FOR THE LIGHTING LOAD INDICATED. APPROVED PRODUCTS ARE LEVITON, LUTRON, HUBBELL, OR EQUAL.

WALL PLATES FOR SWITCHES, TELEPHONE OUTLETS AND OTHER SPECIAL OUTLETS SHALL MATCH THE WALL PLATES PREVIOUSLY SPECIFIED WITH THE RECEPTACLES. ALL PLATES IN EACH ROOM SHALL MATCH. APPROVED PRODUCTS:HUBBELL, LEVITON, BRYANT OR EQUAL.

DISCONNECT SWITCHES SHALL BE HEAVY DUTY, SINGLE THROW DISCONNECT SWITCHES. ENCLOSURE SHALL BE NEMA 1 INDOOR AND NEMA 3R (RAIN TIGHT) ON EXTERIOR OF BUILDING UNLESS SPECIFICALLY NOTED ELSEWHERE IN THE CONTRACT DRAWINGS. DISCONNECT SWITCHES LOCATED ON THE EXTERIOR OF THE BUILDING IN AN AREA ACCESSIBLE TO THE PUBLIC OR SUBJECT TO VANDALISM SHALL BE CAPABLE OF BEING LOCKED IN THE CLOSED (ON) POSITION. THE AMPERE RATING, FLUSIBLE OR NOT FLUSIBLE AND VOLTAGE CHARACTERISTICS SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS. APPROVED PRODUCTS: SQUARE D COMPANY, GE BY ABB, SIEMENS, OR EATON.

INSTALLATION OF WIRING DEVICES: OUTLET HEIGHTS GIVEN BELOW, OR AS SHOWN ON DRAWINGS, ARE TO THE CENTER OF THE OUTLET BOX. IN UNPLASTERED MASONRY WALLS WHERE OUTLETS ARE NOT DIMENSIONED, ADJUST HEIGHT TO THE NEXT HIGHER COURSE, AND ADJUST LOCATION TO THE NEAREST CENTER OF THE MASONRY UNIT.

TESTING: TEST WIRING DEVICES TO ENSURE ELECTRICAL CONTINUITY OF GROUNDING CONNECTIONS, AND AFTER EMERGIZING CIRCUITRY, TO DEMONSTRATE COMPLIANCE WITH REQUIREMENTS.

26 28 16 CIRCUIT BREAKERS

ALL BRANCH CIRCUIT BREAKERS FOR USE WITHIN NEW OR EXISTING PANELBOARDS SHALL CONFORM TO NEMA STANDARDS, SHALL BEAR UL LABELS AND BE UL APPROVED FOR APPLICATION TO WHICH THEY ARE USED, AND SHALL CONFORM TO FEDERAL SPECIFICATION W-C-375 B/GEN.

MOLDED CASE CIRCUIT BREAKERS SHALL BE QUICK-MAKE, QUICK BREAK, THERMAL-MAGNETIC, TRIP INDICATING WITH COMMON TRIP ON MULTIPLE BREAKERS. TRIP INDICATION SHALL BE CLEARLY SHOWN BY BREAKER HANDLE TAKING POSITION BETWEEN "ON" AND "OFF" OR RED INDICATOR WHEN BREAKER IS TRIPPED.

OPERATING MECHANISM SHALL BE ENTIRELY TRIP-FREE SO THAT CONTACTS CAN NOT BE HELD CLOSED AGAINST ABNORMAL OVERCURRENT OR SHORT CIRCUIT.

CIRCUIT BREAKERS SHALL BE OF BOLT-ON TYPE.

CIRCUIT BREAKERS USED AS SWITCHING DEVICES SHALL BE APPROVED FOR THIS APPLICATION AND SHALL BE MARKED "SWD" (SWITCH DUTY).

MULTIPLE CIRCUIT BREAKERS SHALL HAVE INTERNALLY MOUNTED COMMON TRIP UNITS, ONE FOR EACH POLE. THE BARS BETWEEN HANDLES OF CIRCUIT BREAKERS TO MAKE TWO OR THREE POLE CIRCUIT BREAKERS SHALL NOT BE ACCEPTABLE.

CIRCUIT BREAKERS USED AS OVERCURRENT PROTECTION FOR HID TYPE LIGHTING WITH OTHER THAN CONSTANT WATTAGE BALLAST SHALL BE SIZED FOR PROPER AMPERAGE LOAD.

STARTING CURRENT AND OPERATING CURRENT TO BE CHECKED TO DETERMINE CIRCUIT BREAKER SIZE FOR BRANCH CIRCUIT.

MINIMUM INTERRUPTING RATING SHALL BE 10,000 AMP. LARGER INTERRUPTING RATINGS SHALL BE INDICATED ON PLANS.

UNDER NO CIRCUMSTANCES SHALL CIRCUIT BREAKER OF INTERRUPTING RATING LESS THAN SYSTEM AVAILABLE FAULT CURRENT AT BREAKER LOCATION BE INSTALLED.

CIRCUIT BREAKERS ARE TO BE RATED TO FOR CURRENT CARRYING CAPACITY AND WIRING SPACE AT 75°C FOR SIZES 15 AMP AND UP.

CIRCUIT BREAKERS SHALL HAVE AMPERAGE RATING VISIBLE ON HANDLE OR FRONT OF DEVICE.

DIVISION 27 COMMUNICATIONS

27 13 01 COMMUNICATION INFORMATION TECHNOLOGY SYSTEMS

PROVIDE A COMPLETE DATA COMMUNICATIONS AND/OR TELEPHONE SERVICE ENTRANCE CONDUIT SYSTEM, CONSISTING OF AN "EMPTY" CONDUIT SYSTEM AS SHOWN ON THE CONTRACT DRAWINGS.

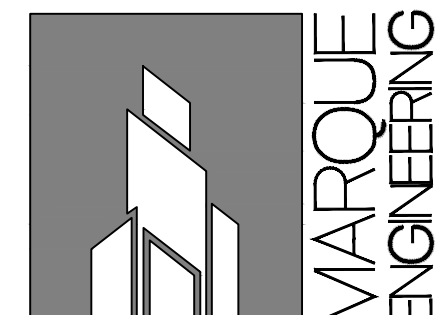
THE OWNER SHALL MAKE ARRANGEMENTS WITH THE DATA COMMUNICATIONS AND/OR TELEPHONE COMPANY FOR INSTALLATION OF THE DATA COMMUNICATION AND/OR TELEPHONE EQUIPMENT AND WIRING. INSTALL A FISH WIRE IN ALL EMPTY CONDUITS TO FACILITATE PULLING OF WIRE BY UTILITY COMPANY.

PROVIDE STANDARD DEVICE BOXES AND COVER PLATES INSTALLED IN WALLS, FLOOR AND CEILINGS.



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Revisions:

Mark	Date	By	Description
Issued			

DIVISION 23 MECHANICAL SPECIFICATIONS

23 05 01 COMMON REQUIREMENTS FOR HVAC

ALL MECHANICAL WORK AND TESTS SHALL BE DONE IN STRICT ACCORDANCE WITH THE LATEST STATE, COUNTY, AND LOCAL REGULATIONS, LAWS, AND ORDINANCES WHICH MAY BE APPLICABLE.

BEFORE SUBMITTING A BID, EXAMINE DOCUMENTS OF ALL OTHER TRADES, VISIT THE SITE AND GET ACQUAINTED WITH ALL CONDITIONS THAT MAY IN ANY WAY AFFECT THE EXECUTION OF THIS CONTRACT. TAKE MEASUREMENTS AND BE RESPONSIBLE FOR EXACT SIZE AND LOCATIONS OF ALL OPENINGS REQUIRED. VERIFY INSTALLATION MAY BE MADE IN COMPLETE ACCORDANCE WITH ALL PERTINENT CODES AND REGULATIONS. IN THE EVENT OF DISCREPANCY, IMMEDIATELY NOTIFY THE PROFESSIONAL ENGINEER OR RECORD. DO NOT PROCEED WITH THE INSTALLATION IN AREAS OF DISCREPANCY UNTIL ALL SUCH DISCREPANCIES HAVE BEEN FULLY RESOLVED.

IT IS NOT THE INTENT OF THE DRAWINGS THAT EXISTING CONDITIONS BE ACCURATELY SHOWN. EXISTING MECHANICAL WORK IS SHOWN TO LIMITED EXTENT ON DRAWINGS AND IS SHOWN FOR GENERAL REFERENCE ONLY. LOCATIONS AND INFORMATION WERE DERIVED FROM CURSORY SITE VISUAL OBSERVATIONS OR FROM DOCUMENTS THAT WERE PREPARED FOR PREVIOUSLY INSTALLED WORK WHEN AVAILABLE.

THE WORK COVERED BY THESE SPECIFICATIONS SHALL CONSIST OF PROVIDING ALL NEW MATERIAL, LABOR, EQUIPMENT, AND SERVICES NECESSARY FOR A COMPLETE MECHANICAL INSTALLATION AS SPECIFIED HEREIN. WORK IN THIS SECTION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING ITEMS:

- PACKAGED ROOF TOP UNITS
- TOILET EXHAUST FANS
- KITCHEN HOOD AND EXHAUST FAN
- LOW VOLTAGE THERMOSTATS
- DUCT
- DAMPERS
- DIFFUSERS, REGISTERS, AND LOUVERS

WHENEVER THE WORDS "CONTRACTOR" APPEAR ON MECHANICAL DRAWINGS OR IN THESE SPECIFICATIONS, IT SHALL REFER TO THE MECHANICAL SUB-CONTRACTOR. WHENEVER THE WORD "PROVIDE" APPEARS IN THESE DOCUMENTS, IT SHALL BE INTERPRETED TO MEAN "FURNISH AND INSTALL".

COORDINATE ALL WORK WITH THE OWNER TO MINIMIZE INTERRUPTION OF BUILDING OPERATION.

COORDINATE THE INSTALLATION OF MECHANICAL ITEMS WITH THE SCHEDULES FOR WORK OF ALL OTHER TRADES TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

THIS CONTRACTOR SHALL VERIFY AND SATISFY HIMSELF THAT ALL EQUIPMENT FURNISHED WILL PROPERLY FIT IN THE SPACE PROVIDED, THAT IT WILL FUNCTION PROPERLY, AND THAT ALL PARTS OF EQUIPMENT REQUIRING SERVICE ARE READILY ACCESSIBLE.

ALL PIPING SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING WALLS AND FRAMING SYSTEM. ALL VERTICAL RUNS SHALL BE HELD AGAINST WALLS, COLUMNS, ETC., AS POSSIBLE TO PERMIT MAKING OF PIPE JOINTS.

CONTRACTOR SHALL PROVIDE A GUARANTEE IN WRITTEN FORM STATING THAT ALL WORK SHALL BE FREE OF DEFECTS OR ERRORS, AND ALL EQUIPMENT, MATERIALS, OR PARTS FOR A PERIOD OF ONE YEAR FROM THE DATE OF OWNER'S FINAL ACCEPTANCE AND SHALL REPAIR, REVISE OR REPLACE AT NO COST TO THE OWNER ANY SUCH DEFECTS OCCURRING WITHIN THE GUARANTEE PERIOD.

CONTRACTOR SHALL ALSO STATE IN WRITTEN FORM THAT ANY ITEMS OR OCCURRENCES ARISING DURING THE GUARANTEE PERIOD WILL BE ATTENDED TO IN A TIMELY MANNER AND WILL IN NO CASE EXCEED THREE (3) WORKING DAYS FROM DATE OF NOTIFICATION BY OWNER.

PROVIDE A COMPLETE INSTALLATION IN CONFORMANCE WITH THE FOLLOWING STANDARDS.

- AGA: AMERICAN GAS ASSOCIATION
- ASHRAE: AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
- NFPA: NATIONAL FIRE PROTECTION ASSOCIATION
- SMACNA: SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION.
- STATEWIDE BUILDING CODE
- INTERNATIONAL MECHANICAL CODE

CONTRACTOR SHALL DO ALL CUTTING AND PATCHING REQUIRED FOR INSTALLATION OF THIS WORK. ALL OPENINGS IN WALLS, FLOORS OR CEILINGS SHALL BE PROPERLY SEALED AND RESTORED IN KIND. FLASH AND COUNTERFLASH AT ROOF OPENINGS.

ALL EQUIPMENT SHALL BE LISTED AND LABELED, UNLESS OTHERWISE APPROVED.

ALL WIRING SHALL MEET THE REQUIREMENTS LISTED IN THE ELECTRICAL SPECIFICATIONS. ALL CONTROL AND INTERLOCK WIRING AND CONDUIT (120V OR 24V) SHALL BE BY THE MECHANICAL CONTRACTOR.

EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE CONDITIONS OF LISTING AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THIS CODE.

CLEANING: THIS CONTRACTOR SHALL REMOVE FROM THE PREMISES ALL ACCUMULATION OF DIRT, DEBRIS, WASTE MATERIALS AND RUBBISH CAUSED BY HIS EMPLOYEES OR WORK, AT LEAST ONE A WEEK, EXCEPT THAT COMBUSTIBLE MATERIALS SHALL BE REMOVED DAILY.

DURING PROGRESS OF THE WORK, MAINTAIN ON DRAWINGS AT THE SITE, AN ACCURATE RECORD OF THE INSTALLATION OF THE MECHANICAL SYSTEM, INDICATING ALL ITEMS WHICH HAVE BEEN CHANGED OR ADDED.

APPLY FOR AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED BY LOCAL AUTHORITY, FOR THE APPROVAL OF WORK.

A CERTIFICATE OF FINAL INSPECTION AND APPROVAL SHALL BE SUBMITTED WITH THE CONTRACTOR'S REQUEST FOR FINAL PAYMENT. NO FINAL PAYMENT WILL BE APPROVED WITHOUT THIS CERTIFICATE.

GUARANTEE ALL WORKMANSHIP, MATERIAL, AND EQUIPMENT AND REPLACE ANY FOUND DEFECTIVE WORK WITHOUT COST TO THE OWNER, FOR A PERIOD OF ONE YEAR AFTER FINAL ACCEPTANCE.

EXISTING CONDITIONS

DO NOT REUSE REMOVED MECHANICAL MATERIALS UNLESS SPECIFICALLY INDICATED ON DRAWINGS. EXISTING SYSTEMS MAY BE UTILIZED ONLY TO THE EXTENT INDICATED ON DRAWINGS.

IF REQUIRED TO ACCOMMODATE CONSTRUCTION RELATED ACTIVITIES TEMPORARILY REMOVE, STORE IN PROTECTED LOCATION ON SITE, AND REINSTALL CONFLICTING MECHANICAL EQUIPMENT, OR DEVICES THAT ARE TO REMAIN OR TO BE RELOCATED.

WHERE THE TERM "DEMOLITION" IS USED HEREIN, INTERPRET IT TO MEAN "DEMOLITION" OR "SELECTIVE DEMOLITION" WHERE APPLICABLE.

PROVIDE MECHANICAL DEMOLITION WORK AS REQUIRED TO ACCOMMODATE PROJECT DEMOLITION AND AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. DISCONNECT AND REMOVE WORK TO BE ABANDONED, AND AS REQUIRED TO ACCOMMODATE WORK OF OTHER TRADES, IN AREAS AFFECTED BY THIS PROJECT.

LEGALLY DISPOSE OF MATERIALS TO SALVAGED OR RETAINED.

23 05 03 SUBMITTALS FOR MECHANICAL SYSTEMS

DESIGN BASIS MANUFACTURERS OF MATERIAL AND EQUIPMENT ARE SPECIFIED AND PLANS ARE DETAILED ACCORDING TO THIS MATERIAL. CONTRACTOR SHALL BASE HIS BID ON FURNISHING AND INSTALLING THIS MAKE OF MATERIAL AND EQUIPMENT.

AN ACCEPTABLE MANUFACTURER'S NAME AND MODEL NUMBER OF A PRODUCT MAY BE PROVIDED IN THESE DOCUMENTS. THIS IS THE EQUIPMENT INCLUDED DURING THE DESIGN PROCESS AND FORMS THE BASIS OF A STANDARD OF QUALITY. WHERE MORE THAN ONE MAKE OF MATERIAL OR EQUIPMENT IS SPECIFIED, THE CONTRACTOR SHALL STATE IN HIS BID WHICH MAKE HE PROPOSES TO FURNISH AND INSTALL. SHOP DRAWING APPROVAL SHALL BE OBTAINED PRIOR TO SHIPMENT OF EQUIPMENT.

VERIFY THE MODEL NUMBER OR PRODUCT IS STILL ACCURATE AND MEETS ALL REQUIREMENTS SHOWN ON THE DRAWINGS. IF THERE IS A DISCREPANCY BETWEEN THE REQUIREMENTS AND THE PRODUCT OR MODEL NUMBER, THE STRICTER OF THE TWO SHALL GOVERN.

SUBMIT SHOP DRAWINGS AND/OR PRODUCT DATA (ELECTRONIC COPIES) ON THE FOLLOWING ITEMS FOR REVIEW BEFORE FABRICATION OR SHIPMENT.

- PACKAGED ROOF TOP UNITS
- TOILET EXHAUST FANS
- KITCHEN HOOD AND EXHAUST FAN
- LOW VOLTAGE THERMOSTATS
- DUCT
- DAMPERS
- DIFFUSERS, REGISTERS, AND LOUVERS

MAINTENANCE MANUALS: THE MANUALS SHALL INCLUDE WIRING DIAGRAMS, MAINTENANCE AND OPERATING INSTRUCTIONS, PARTS LISTINGS, AND COPIES OF OTHER SUBMITTALS INDICATED FOR INCLUSION.

REVIEW AND CORRECTIONS OR COMMENTS MADE ON SHOP DRAWINGS, PRODUCT DATA: CATALOGS, CUT SHEETS, CHARTS, AND OTHER ITEMS DURING CONSTRUCTION PHASE SUBMITTAL REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE CONTRACT DOCUMENTS, FOR PROVIDING A COMPLETE AND FUNCTIONING PROJECT, NOR SHALL THEY RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR DEVIATIONS OR ERRORS OF ANY SORT. THIS REVIEW IS FOR THE LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH INFORMATION GIVEN AND THE DESIGN CONCEPT EXPRESSED IN THE CONTRACT DOCUMENTS. CONTRACTOR REMAINS RESPONSIBLE FOR DETERMINING THE ACCURACY AND COMPLETENESS OF OTHER DETAILS SUCH AS DIMENSIONS AND QUANTITIES, FOR SUBSTANTIATING

INSTRUCTIONS FOR INSTALLATIONS, VERIFYING MATERIALS REQUIRED, OBTAINING FIELD MEASUREMENTS AND RELATED CRITERIA, COORDINATING WORK WITH OTHER DISCIPLINES AND PERFORMING WORK IN COMPLIANCE WITH THE CONTRACT DOCUMENTS.

ANY CHANGES TO ITEMS SPECIFIED MUST BE SUBMITTED IN WRITING AS A SUBSTITUTION, WITH COMPLETE DOCUMENTATION OF PRICE DIFFERENTIAL AND EQUIPMENT DETAILS. ANY SUBSTITUTIONS PROVIDED SHALL BE REVIEWED AT MARQUE ENGINEERING'S HOURLY RATES. REVIEW SHALL BE PAID FOR BY THE CONTRACTOR TO MARQUE ENGINEERING AT NO COST TO THE OWNER. BY USING PRE-APPROVED SUBSTITUTIONS, THE CONTRACTOR ACCEPTS ALL RESPONSIBILITY AND ASSOCIATED COSTS FOR ALL REQUIRED MODIFICATIONS TO THE CONTRACT DOCUMENTS TO INCLUDE BUT NOT LIMITED TO MATERIAL OR EQUIPMENT COSTS FOR THEIR OR OTHER TRADES, AND ENSURING THAT SUBSTITUTED MATERIALS AND EQUIPMENT TO BE FURNISHED FIT INTO SPACE AVAILABLE.

EXTENSIVE REVISIONS NECESSITATED TO THE CONTRACT DOCUMENTS, OR SUBSTITUTION ACTIONS RELATED TO ANY SPECIFIED PRODUCT NOT ABLE TO BE PROVIDED DUE TO A FAILURE TO COMMENCE WORK, RELEASE PRODUCT OR COORDINATE CONSTRUCTION ACTIVITIES SHALL BE PROVIDED AT MARQUE ENGINEERING'S HOURLY RATES. COSTS SHALL BE BORN BY THE CONTRACTOR AT NO COST TO THE OWNER.

23 05 29 HANGERS AND SUPPORTS

SUPPORT ALL PIPING, DUCTWORK AND EQUIPMENT BY HANGERS OR BRACKETS. FURNISH STRUCTURAL STEEL MEMBERS WHERE REQUIRED TO SUPPORT PIPING AND EQUIPMENT. NO PORTION OF PIPING OR VALVES SHALL BE SUPPORTED BY EQUIPMENT.

DUCTWORK - SUPPORT BY MEANS OF HANGERS AS FOLLOWS:
DUCT WIDTH 30 OR LESS
HANGER SIZE 16 GAUGE
TYPE MAX. SPACING 8
A PAIR OF HANGERS SHALL BE LOCATED AT EVERY TRANSVERSE JOINT AND ELSEWHERE ACCORDING TO THE TABLE.

23 05 93 HVAC SYSTEM TESTING , ADJUSTING AND BALANCING FOR HVAC

ALL SYSTEMS AND EQUIPMENT SHALL BE CAREFULLY ADJUSTED TO PROVIDE COMFORTABLE AND UNIFORM CONDITIONS IN EACH AND EVERY SPACE TO THE OWNER'S SATISFACTION. PROVIDE ANY REQUIRED DRIVES TO SATISFY QUANTITIES INDICATED. PROVIDE A CERTIFIED AIR BALANCE OF THE DIFFUSERS AND AIR HANDLERS.

AIR SYSTEM:

AIR BALANCE AND TESTING SHALL NOT BEGIN UNTIL THE SYSTEM HAS BEEN COMPLETED AND IS IN FULL WORKING ORDER. CONTRACTOR SHALL PUT ALL HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS AND EQUIPMENT INTO FULL OPERATION AND SHALL CONTINUE THE OPERATION OF SAME DURING EACH WORKING DAY OF TESTING AND BALANCING. CONTRACTOR SHALL SUBMIT WITHIN 30 DAYS AFTER RECEIPT OF CONTRACT, COPIES OF SUBMITTAL DATA FOR THE TESTING AND BALANCING OF THE AIR CONDITIONING, HEATING, AND VENTILATING SYSTEMS, THE AIR BALANCE AND TESTING AGENCY SHALL PROVIDE PROOF OF HAVING SUCCESSFULLY COMPLETED AT LAST FIVE PROJECTS OF SIMILAR SIZE AND SCOPE.

CONTRACTOR SHALL PROCURE THE SERVICES OF AN INDEPENDENT AIR BALANCE AND TESTING AGENCY, APPROVED BY THE ENGINEER, AND A MEMBER OF AABC OR NEBB, WHICH SPECIALIZES IN THE BALANCING AND TESTING OF HEATING VENTILATION AND AIR CONDITIONING SYSTEMS, TO BALANCE, ADJUST AND TEST AIR MOVING EQUIPMENT AND AIR DISTRIBUTION OR EXHAUST SYSTEMS AS HEREIN SPECIFIED.

ALL WORK BY THIS AGENCY SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A QUALIFIED HEATING AND VENTILATING ENGINEER EMPLOYED BY THIS AGENCY. ALL INSTRUMENTS USED BY THIS AGENCY SHALL BE ACCURATELY CALIBRATED AND MAINTAINED IN GOOD WORKING ORDER.

23 07 13 DUCT INSTALLATION

INSULATE ALL SUPPLY, DIFFUSER PLENUMS, AND OUTSIDE AIR DUCTWORK OF ALL UNITS WITH OWENS CORNING "ALL SERVICE DUCT WRAP" TYPE 150 GLASS FIBER INSULATION UNLESS OTHERWISE NOTED. INSULATION SHALL BE 1-1/2" THICK (2" THICK FOR SUPPLY AND RETURN IN TRUSS SPACE), 1.5 PCF. DENSITY WITH FRK JACKET .002 THICK REINFORCED ALUMINUM FOIL VAPOR BARRIER. INSULATION SHALL CONFORM TO NFPA 90A AND 90B PER ASTM E-84 FOR FLAME SPREAD AND SMOKE DEVELOPED RATING.

INSULATE ALL EXTERIOR SUPPLY AND RETURN DUCTWORK WITH RIGID FIBERGLASS BOARD INSULATION WITH OUTDOOR JACKET. INSULATION SHALL BE 2" THICK WITH A "K" VALUE OF 0.23 AT 75 F. INSTALL ON DUCTWORK USING IMPALÉ ANCHORS AND WIRES. SEAL VAPOR BARRIER WITH VAPOR BARRIER ADHESIVE.

PROVIDE INSULATION ON ALL CONCEALED SUPPLY, RETURN DUCTWORK. ALL LINERS, INSULATION AND ADHESIVES SHALL HAVE A FLAME SPREAD INDEX NOT MORE THAN 25 AND A SMOKE DEVELOPED INDEX OF NOT MORE THAN 50.

RIGID FIBERGLASS DUCTWORK INSULATION: GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 612, TYPE II, WITHOUT FACING AND WITH VAPOR BARRIER ALL SERVICE JACKET MANUFACTURED FROM KRAFT PAPER, REINFORCING SCRIM, ALUMINUM FOIL, AND VINYL FILM. INSULATION SHALL HAVE A MINIMUM R VALUE AS REQUIRED BY CODE.

FLEXIBLE FIBERGLASS DUCTWORK INSULATION: GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 553, TYPE II, WITHOUT FACING AND WITH VAPOR BARRIER ALL SERVICE JACKET MANUFACTURED FROM KRAFT PAPER, REINFORCING SCRIM, ALUMINUM FOIL, AND VINYL FILM. INSULATION SHALL HAVE A MINIMUM R VALUE AS REQUIRED BY CODE.

VAPOR BARRIER MATERIAL FOR DUCTWORK: PAPER-BACKED ALUMINUM-FOIL, EXCEPT AS OTHERWISE INDICATED; STRENGTH AND PERMEABILITY RATING EQUIVALENT TO FACTORY-APPLIED VAPOR BARRIERS ON ADJOINING DUCTWORK INSULATION, WHERE AVAILABLE; WITH FOLLOWING ADDITIONAL CONSTRUCTION CHARACTERISTICS:

HIGH PUNCTURE RESISTANCE: LOW VAPOR TRANSMISSION (FOR DUCTS IN EXPOSED AREAS: MECH. ROOMS, ETC.) MODERATE PUNCTURE RESISTANCE: MEDIUM VAPOR TRANSMISSION (FOR DUCTS IN CONCEALED AREAS).

INSTALLATION IS NOT PERMITTED ABOVE DRYWALL CEILINGS AND INACCESSIBLE CEILINGS.

23 09 93 SEQUENCE OF OPERATION

PACKAGED ROOFTOP UNIT

STARTUP
THE UNIT SHALL OPERATE ON A 7 DAY/NIGHT PROGRAMMABLE THERMOSTAT. DURING STARTUP, THE FAN SHALL RUN WITH THE DAMPERS IN THE FULL RECIRCULATION POSITION. PROVIDE OCCUPIED CHANGEOVER SEQUENCE WITH OPTIMUM START FUNCTION. WHEN THE RETURN AIR TEMPERATURE REACHES OCCUPIED SETPOINT (ADJUSTABLE), THE MINIMUM OUTSIDE AIR DAMPER SHALL OPEN TO THE CONTROLLED MINIMUM OUTDOOR AIR POSITION.

SUPPLY FAN CONTROL
THE SUPPLY FAN SPEED SHALL BE CONSTANT AND SET TO THE REQUIRED CFM.

SPACE TEMPERATURE CONTROL
PROVIDE LOCAL WALL MOUNTED ROOM TEMPERATURE THERMOSTAT WITH DIGITAL DISPLAY OF ROOM TEMPERATURE AND SETPOINT (+/- DEG. F, ADJUSTABLE), AND OVERRIDE FEATURE. PROVIDE REMOTE SENSOR TO MONITOR SPACE TEMPERATURE AND MAINTAIN THERMOSTAT SETPOINT.

MINIMUM OUTSIDE AIR CONTROL
DURING OCCUPIED MODE THE MINIMUM OUTSIDE AIR DAMPER SHALL BE OPEN. PROVIDE MOTORIZED OUTDOOR AIR DAMPER.

ECONOMIZER CONTROL
DRY BULB CONTROLLED ECONOMIZER: OPERATED TO AUTOMATICALLY USE OUTDOOR AIR FOR "FREE COOLING" WHEN OUTDOOR AIR TEMPERATURE IS AT ACCEPTABLE LEVELS. AUTOMATICALLY MODULATED OUTDOOR AND RETURN AIR DAMPERS MAINTAIN PROPER DISCHARGE AIR TEMPERATURE INTO THE CONDITIONED SPACE. ADJUSTABLE MINIMUM POSITION CONTROL IS STANDARD. ECONOMIZER SHALL HAVE POWERED OR BAROMETRIC RELIEF, AS SCHEDULED.

COOLING CONTROL
COOLING SHALL BE CONTROLLED TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON A CALL FOR COOLING THE HEATING SHALL BE OFF. ON A FURTHER CALL FOR COOLING, ENABLE THE ECONOMIZER MODE. ON A FURTHER CALL FOR COOLING, DISABLE THE ECONOMIZER MODE AND THE MECHANICAL COOLING SHALL BE STAGED ON.

HEATING CONTROL
HEATING SHALL BE CONTROLLED TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON A CALL FOR HEATING, THE MECHANICAL COOLING SHALL BE OFF. ON A FURTHER CALL FOR HEATING, THE ECONOMIZER MODE SHALL BE DISABLED. ON A FURTHER CALL FOR HEATING THE GAS HEATING SHALL BE STAGED ON.

SMOKE DETECTOR
WHEN THE SMOKE DETECTOR IS ALARMED, THE SYSTEM SHALL BE ALARMED AND THE AIR HANDLER SHALL FALL SAFE WITH MANUAL RESET. ELECTRICAL CONTRACTOR SHALL FURNISH, HVAC CONTRACTOR SHALL MOUNT & ELECTRICAL CONTRACTOR SHALL WIRE A UL LISTED PHOTOELECTRIC SMOKE DETECTOR PER LOCAL CODE AUTHORITY HAVING JURISDICTION.

UNOCCUPIED MODE
DURING THE UNOCCUPIED MODE OF OPERATION, THE RTU SHALL GO INTO NIGHT SETBACK MODE. AT NIGHT SETBACK/SHUTDOWN THE RTU SHALL GO TO FALL SAFE POSITION. FALL SAFE POSITION IS DEFINED BY THE FOLLOWING: THE SUPPLY FAN IS OFF, THE OUTDOOR AIR INTAKE DAMPER IS CLOSED, THE HEATING IS OFF AND THE MECHANICAL COOLING IS OFF. THE SUPPLY FAN SHALL CYCLE IN CONJUNCTION WITH EITHER THE HEATING OR COOLING SYSTEM TO MAINTAIN A MINIMUM/MAXIMUM SPACE TEMPERATURE DEPENDING ON THE SEASON.

COOL SUPPLY AIR: ON AN INCREASE IN SPACE TEMPERATURE THE PRODIGY REGULATES THE THE DIFFUSER'S AIR DAMPER OPEN TO INCREASE THE FLOW OF COOL AIR. ON AN INCREASE OF SPACE TEMPERATURE GREATER THAN THE COOLING

PROPORTIONAL BAND, THE DAMPER POSITION (%) IS MAINTAINED AT ITS PRE-SELECTED MAXIMUM SETTING.
ON A DECREASE IN SPACE TEMPERATURE THE PRODIGY REGULATES THE DIFFUSER'S AIR DAMPER CLOSED TO REDUCE THE FLOW OF COOL AIR. IF THE SPACE TEMPERATURE DECREASES TO LESS THAN THE COOLING PROPORTIONAL BAND, THE DAMPER POSITION (%) IS MAINTAINED AT THE PRE-SELECTED MINIMUM SETTING.

WARM SUPPLY AIR: ON A DECREASE IN SPACE TEMPERATURE THE PRODIGY REGULATES THE DIFFUSER'S AIR DAMPER OPEN TO INCREASE THE FLOW OF WARM AIR. ON A DECREASE OF SPACE TEMPERATURE GREATER THAN THE HEATING PROPORTIONAL BAND, THE DAMPER POSITION (%) IS MAINTAINED AT ITS PRE-SELECTED MAXIMUM SETTING.
ON AN INCREASE IN SPACE TEMPERATURE THE PRODIGY REGULATES THE DIFFUSER'S AIR DAMPER TO REDUCE THE FLOW OF WARM AIR. IF THE SPACE TEMPERATURE INCREASES ABOVE THE HEATING PROPORTIONAL BAND, THE DAMPER POSITION (%) IS MAINTAINED AT THE PRE-SELECTED MINIMUM SETTING.

LOW VOLTAGE THERMOSTATS SHALL BE PROVIDED AND WIRED BY THE HVAC CONTRACTOR. ELECTRICAL CONTRACTOR SHALL PROVIDE 4" SQUARE X 1- 1/2" DEEP WALL OUTLET BOXES (WITH SINGLE-GANG RINGS) FOR ALL THERMOSTATS/SENSORS. ELECTRICAL CONTRACTOR SHALL PROVIDE ONE 3/4" EMPTY CONDUIT FROM EACH THERMOSTAT/SENSOR LOCATION, TURNED OUT ABOVE ACCESSIBLE CEILINGS (IN JOIST SPACE OR AGAINST OVERHEAD SLAB/DECK). HVAC/TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE ALL OTHER NECESSARY CONDUIT, RACEWAY AND WIRING RELATED WORK. CONDUIT SHALL BE IDENTIFIED IN CEILING CAVITY AND SHALL BE PROVIDED WITH SWEEP BENDS, BUSHINGS AND DRAGLINE.

EXHAUST FANS SHALL BE TIED TO LIGHT SWITCH, WHICH SHALL BE FURNISHED, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR. WHEN ACTIVATED, EXHAUST FAN MOTOR DAMPER SHALL OPEN AND FAN SHALL START.

KITCHEN HOOD EXHAUST FANS: PROVIDE HEAT DETECTOR IN HOOD COLLAR INTERLOCKED TO FAN OPERATION. KITCHEN HOOD EXHAUST SYSTEM SHALL BE INITIATED BY THE HEAT DETECTOR. PROVIDE INDICATOR LIGHT ON FACE OF HOOD. AT STARTUP, ENERGIZE EXHAUST FAN MOTOR. INTERLOCK TO MAKEUP AIR SYSTEM (WHETHER DEDICATED MAKEUP AIR OR MAKEUP AIR FROM HVAC SYSTEM), SO THAT MAKEUP AIR IS PROVIDED WHENEVER EXHAUST FAN IS RUNNING. EXHAUST FAN SHALL RUN CONTINUOUSLY AT CONSTANT SPEED. AT SHUTDOWN, THE EXHAUST FAN SHALL STOP.

PROVIDE ALL CONTROLS AND WIRING FOR COMPLETE INTERLOCK AND OPERATION OF KITCHEN HOOD, EXHAUST FAN, ROOFTOP UNIT, ETC. AND ALL ASSOCIATED DAMPERS.

ALL DUCT SMOKE DETECTORS, FOR SMOKE DETECTORS, WILL BE FURNISHED PROVIDED AND WIRED BY ELECTRICAL CONTRACTOR, INSTALLED BY THE HVAC CONTRACTOR, AND WIRED BY THE ELECTRICAL CONTRACTOR PER LOCAL CODES. HVAC CONTRACTOR WILL INTERLOCK FAN WITH SMOKE DETECTOR.

MOTOR OPERATED DAMPERS: ALL FRESH AIR INTAKES AND EXHAUST LOUVERS SHALL HAVE MOTOR OPERATED DAMPERS. DAMPERS SHALL BE LOW LEAK WITH BLADE AND EDGE SEALS. 24 V MOTOR OPERATED DAMPERS SHALL BE PROVIDED AND WIRED BY THE MECHANICAL CONTRACTOR, UNLESS OTHERWISE NOTED. PROVIDE ALL NECESSARY TRANSFORMERS, CONTACTORS, CONTROLS AND WIRING FOR INTERLOCKING EQUIPMENT TO MOTOR OPERATED DAMPERS.

23 30 00 AIR DISTRIBUTION SYSTEM

CEILING AIR DIFFUSERS:
SQUARE: SQUARE HOUSING, CORE OF SQUARE CONCENTRIC LOUVERS, SQUARE OR ROUND DUCT CONNECTION.

LINEAR: EXTRUDED ALUMINUM CONTINUOUS SLOT, SINGLE OR MULTIPLE.

DIFFUSER MOUNTINGS:
SURFACE MOUNT: DIFFUSER SHALL HAVE ROLLED EDGE BELOW FINISHED CEILING FOR SURFACE MOUNTING OR DIFFUSER SHALL BE FURNISHED WITH ACCESSORY PLASTER FRAME.

LAY-IN: DIFFUSER HOUSING SIZED TO FIT BETWEEN CEILING EXPOSED SUSPENSION TEE BARS AND REST ON TOP SURFACE OF TEE BAR.

DIFFUSER ACOUSTIC PERFORMANCE: NC LESS THAN OR EQUAL TO 30

DIFFUSER ACCESSORIES: PLASTER RING; PERIMETER RING DESIGNED TO ACT AS PLASTER STOP AND DIFFUSER ANCHOR.

DIFFUSER FINISHES: WHITE ENAMEL; SEMI-GLOSS WHITE ENAMEL PRIME FINISH.

CEILING AND WALL REGISTERS & GRILLES:
STEEL CONSTRUCTION; MANUFACTURER'S STANDARD STAMPED SHEET STEEL FRAME AND ADJUSTABLE BLADES.

REGISTER AND GRILLE FINISHES: WHITE ENAMEL; SEMI-GLOSS WHITE ENAMEL PRIME FINISH.

REGISTER AND GRILLE ACOUSTIC PERFORMANCE: NC LESS THAN OR EQUAL TO 30

23 31 13 METAL DUCTS

CONSTRUCTION, INSTALLATION AND SUPPORT OF ALL DUCTWORK SHALL CONFORM TO THE LATEST EDITION OF SMACNA "HVAC DUCT CONSTRUCTION STANDARD - METAL AND FLEXIBLE".

ASSEMBLE AND INSTALL DUCTWORK IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES TO ACHIEVE AIR-TIGHT (5% LEAKAGE FOR SYSTEMS RATED 3" AND UNDER, 1% FOR SYSTEMS RATED OVER 3") AND NOISELESS (NO OBJECTIONABLE NOISE) SYSTEMS. INSTALL EACH RUN WITH MINIMUM NUMBER OF JOINTS. ALIGN DUCTWORK ACCURATELY AT CONNECTIONS, WITHIN 1/8" MISALIGNMENT TOLERANCE AND WITH INTERNAL SURFACES SMOOTH.

SUPPORT VERTICAL DUCTS AT EVERY FLOOR. SUPPORT DUCT WITH APPROVED HANGERS AT INTERVALS NOT EXCEEDING 10 FEET.

DUCTS SHALL BE GALVANIZED SHEET METAL OF STANDARD GAUGES. DUCTWORK SHALL HAVE A MINIMUM THICKNESS OF .24 GAUGE. ALL DUCT ELBOWS SHALL BE EITHER FULL RADIUS OR WITH TURNING VANES.

WHERE DUCTWORK IS INDICATED TO BE EXPOSED IN OCCUPIED SPACES, PROVIDE MATERIALS WHICH ARE FREE FROM VISUAL IMPERFECTIONS INCLUDING PITTING, SEAM MARKS, ROLLER MARKS, STAINS AND DISCOLORATIONS, AND OTHER IMPERFECTIONS, INCLUDING THOSE WHICH WOULD IMPAIR PAINTING.

EXPOSED DUCTWORK WHICH IS TO BE PAINTED SHALL HAVE PAINT GRIP APPLIED.

PROVIDE VOLUME DAMPERS IN ALL BRANCH DUCTS OR AS REQUIRED FOR BALANCING TO REQUIRED AIR FLOWS.

PROVIDE RADIUS TYPE FITTINGS FABRICATED OF MULTIPLE SECTIONS WITH MAXIMUM 15 DEG. CHANGE OF DIRECTION PER SECTION, UNLESS DETAILED OTHERWISE. USE 45 DEG. LATERALS AND 45 DEG. ELBOWS FOR BRANCH TAKEOFF CONNECTIONS. WHERE 90 DEG. BRANCHES ARE INDICATED, PROVIDE CONICAL TYPE TEES.

PROVIDE DUCT SEALANT AND/OR CEMENT WHICH IS NON-HARDENING, NON-MIGRATING MASTIC OR OF LIQUID ELASTIC SEALANT, TYPE APPLICABLE FOR FABRICATION/INSTALLATION DETAIL, AS COMPOUNDED AND RECOMMENDED BY MANUFACTURER SPECIFICALLY FOR SEALING JOINTS AND SEAMS IN DUCTWORK.

FLEXIBLE DUCTS SHALL EITHER BE SPIRAL-WOUND SPRING STEEL WITH FLAMEPROOF VINYL SHEATHING OR CORRUGATED ALUMINUM. THE MAXIMUM LENGTH OF FLEX DUCT ON THE SUPPLY EQUALS 5 FEET. FLEX IS NOT ALLOWED FOR RETURN, RELIEF OR EXHAUST APPLICATIONS.

FLEXIBLE DUCTS SHALL CONFORM TO THE REQUIREMENTS OF UL 181 FOR CLASS 0 OR CLASS 1 FLEXIBLE AIR DUCTS AND SHALL BE SO IDENTIFIED.

WHERE INSTALLED IN UNCONDITIONED SPACES OTHER THAN RETURN AIR PLENUMS, PROVIDE 1" THICK 1-1/2" LB. CONTINUOUS FLEXIBLE FIBERGLASS SHEATH WITH VINYL VAPOR BARRIER JACKET.

SHOP FABRICATE DUCTWORK IN 4, 8, 10 OR 12-FT LENGTHS, OR REQUIRED TO COMPLETE RUNS.

FABRICATE DUCTWORK WITH DUCT LINER IN EACH SECTION OF DUCT WHERE INDICATED. LAMINATE LINER TO INTERNAL SURFACES OF DUCT IN ACCORDANCE WITH INSTRUCTIONS BY MANUFACTURERS OF LINING AND ADHESIVE, AND FASTEN WITH MECHANICAL FASTENERS. DUCT LINER TO BE 3-LB DENSITY FOR ACOUSTIC REQUIREMENTS 1" THICK OR AS NOTED. SIZE OF DUCTWORK SHOWN ON THE DRAWINGS IS FREE NET AREA, OUTSIDE DIMENSION OF DUCTS WILL NEED TO BE INCREASED IF LINED DUCT IS USED.

DUCT LINER SHALL BE OF FIBROUS GLASS OF THICKNESS INDICATED. 3-LB DENSITY. ALL LINERS, INSULATION AND ADHESIVES SHALL HAVE A FLAME SPREAD INDEX NOT MORE THAN 25 AND A SMOKE DEVELOPED INDEX OF NOT MORE THAN 50.

23 33 13 DAMPERS

DAMPERS WITH LOCKING DEVICE, WHERE ACCESSIBLE, SHALL BE RUSKIN MD-35, OPPOSED BLADE FOR RECTANGULAR DUCTS 12 INCHES AND ABOVE, AND MODEL MD-25 PARALLEL BLADE FOR DUCTS 10 INCHES AND BELOW, AND MODEL MD-25 FOR ROUND DUCTS. INSTALL PER MANUFACTURER'S INSTRUCTIONS. SINGLE BLADE ROUND DAMPERS WITH LOCKING DEVICE SHALL BE IN SPIN-IN COLLARS.

FIRE DAMPERS SHALL BE RUSKIN MODEL IBD, STYLE B WITH BLADE PACKAGE OUT OF AIR STREAM. HORIZONTAL, INSTALL

WHERE INDICATED ON DRAWINGS AND AS REQUIRED BY AUTHORITY HAVING LOCAL JURISDICTION.

ELECTRIC MOTORIZED DAMPER SHALL BE SIZED TO OPERATE WITH SUFFICIENT RESERVE POWER TO PROVIDE SMOOTH MODULATING ACTION OR TWO-POSITION ACTION. INSTALL PER MANUFACTURER'S INSTRUCTIONS.

23 38 13.00 - COMMERCIAL KITCHEN HOODS AND DUCTWORK

TYPE I HOOD

REFER TO CAPTIVE AIRE DRAWINGS FOR SPECIFICATIONS.

INSPECTION
GENERAL: EXAMINE AREAS AND CONDITIONS UNDER WHICH EQUIPMENT IS TO BE INSTALLED. DO NOT PROCEED WITH WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

INSTALLATION
COORDINATE WORK WITH WORK OF ROOFING, WALLS, AND CEILINGS, AS NECESSARY FOR PROPER INTERFACING. DUCT CONNECTIONS TO BE PROVIDED BY THE HVAC CONTRACTOR.

REFER TO MANUFACTURERS INSTALLATION INSTRUCTIONS.

ELECTRICAL WIRING: INSTALL ELECTRICAL DEVICES FURNISHED BY MANUFACTURER BUT NOT SPECIFIED TO BE FACTORY-MOUNTED. FURNISH COPY OF MANUFACTURER'S WIRING DIAGRAM SUBMITTAL TO ELECTRICAL INSTALLER.

VERIFY THAT ELECTRICAL WIRING INSTALLATION IS IN ACCORDANCE WITH MANUFACTURER'S SUBMITTAL AND INSTALLATION REQUIREMENTS OF DIVISION-16 SECTIONS.

ENSURE THAT ROTATION IS IN DIRECTION INDICATED AND INTENDED FOR PROPER PERFORMANCE.

DO NOT PROCEED WITH CENTRIFUGAL FAN START-UP UNTIL WIRING INSTALLATION IS ACCEPTABLE TO FAN INSTALLER.

FIELD QUALITY CONTROL
TESTING: AFTER INSTALLATION OF HOOD EXHAUST SYSTEM HAS BEEN COMPLETED, TEST EACH SYSTEM TO DEMONSTRATE PROPER OPERATION OF UNITS AT PERFORMANCE REQUIREMENTS SPECIFIED. WHEN POSSIBLE, FIELD CORRECT MALFUNCTIONING UNITS, THEN RETEST TO DEMONSTRATE COMPLIANCE. REPLACE UNITS WHICH CANNOT BE SATISFACTORILY CORRECTED.

PROVIDE TESTING, PERMITS AND APPROVALS AS REQUIRED BY STATE AND LOCAL AUTHORITIES.

ADJUSTING AND CLEANING
CLEAN FACTORY-FINISHED SURFACES.

REPAIR ANY MARRED OR SCRATCHED SURFACES.

TYPE I KITCHEN GREASE DUCT SPECIFICATION

FURNISH SINGLE WALL 16 GAUGE CARBON STEEL DUCTWORK WITH CONTINUOUS LIQUID TIGHT WELDS. ALL DUCTWORK SHALL BE WRAPPED WITH A FIRE RESISTIVE MATERIAL. THE DUCT WRAP SYSTEM SHALL BE UL LISTED PER ASTM E 2336 FOR ZERO CLEARANCE TO COMBUSTIBLES AND SHALL MAINTAIN A FLAME/SMOKE RATING LESS THAN 25/50.

THE TERMINATION OF KITCHEN EXHAUST OUTLETS SHALL NOT BE LESS THAN 10 FEET HORIZONTALLY FROM PARTS OF THE SAME OR CONTIGUOUS BUILDINGS, ADJACENT PROPERTY LINES AND AIR INTAKES.

OUTLET SHALL NOT BE LESS THAN 10 FEET VERTICALLY ABOVE ADJOINING GRADE LEVEL AND 40" ABOVE THE ROOF LEVEL.

THE EXHAUST FAN SHALL BE INSTALLED A MINIMUM OF 10'-0" FROM ANY ROOF EDGE REGARDLESS OF LOCATION INDICATED ON PLANS, UNLESS A SCREEN WALL OR RAILING IS INSTALLED PER THE LOCAL BUILDING CODE. SEE THE ARCHITECTURAL PLANS FOR COORDINATION.

TYPE II KITCHEN HOOD

HOOD TO BE CONSTRUCTED OF MINIMUM 24 GAUGE STAINLESS STEEL, USING THE STANDING SEAM METHOD FOR OPTIMUM STRENGTH. ALL SEAMS, JOINTS AND PENETRATIONS OF THE HOOD ENCLOSURE SHALL BE WELDED AND/OR LIQUID TIGHT. LIGHTER MATERIAL GAUGES, ALTERNATE MATERIAL TYPES AND FINISHES ARE NOT ACCEPTABLE.

PROVIDE VAPOR PROOF, U.L. LISTED INCANDESCENT LIGHT FIXTURES WHICH SHALL BE PRE-WIRED TO A JUNCTION BOX SITUATED AT THE TOP OF THE HOOD FOR FIELD CONNECTION. WIRING SHALL CONFORM TO THE REQUIREMENTS OF NFPA 70. THE CANOPY HOOD SHALL BE BUILT IN ACCORDANCE WITH NFPA 96, UMC, AND SHALL BEAR THE NSF SEAL OF APPROVAL.

TYPE II KITCHEN HOOD DUCT SPECIFICATION

FURNISH SINGLE WALL RIGID DUCT MADE OF ALUMINUM AND SLOPED BACK TO HOOD. DUCTWORK SUBJECT TO POSITIVE PRESSURE OR MOISTURE-LADEN AIR SHALL BE CONSTRUCTED, JOINED AND SEALED IN ACCORDANCE WITH INTERNATIONAL MECHANICAL CODE.

THE TERMINATION OF KITCHEN EXHAUST OUTLETS SHALL NOT BE LESS THAN 10 FEET HORIZONTALLY FROM PARTS OF THE SAME OR CONTIGUOUS BUILDINGS, ADJACENT PROPERTY LINES AND AIR INTAKES.

OUTLET SHALL NOT BE LESS THAN 10 FEET VERTICALLY ABOVE ADJOINING GRADE LEVEL.

DIVISION 22 - PLUMBING SPECIFICATION

22 05 00 COMMON WORK RESULTS FOR PLUMBING

ALL PLUMBING WORK AND TESTS SHALL BE DONE IN STRICT ACCORDANCE WITH THE LATEST STATE, COUNTY, AND LOCAL REGULATIONS, LAWS, AND ORDINANCES WHICH MAY BE APPLICABLE.

BEFORE SUBMITTING A BID, EXAMINE DOCUMENTS OF ALL OTHER TRADES, VISIT THE SITE AND GET ACQUAINTED WITH ALL CONDITIONS THAT MAY IN ANY WAY AFFECT THE EXECUTION OF THIS CONTRACT. TAKE MEASUREMENTS AND BE RESPONSIBLE FOR EXACT SIZE AND LOCATIONS OF ALL OPENINGS REQUIRED. VERIFY INSTALLATION MAY BE MADE IN COMPLETE ACCORDANCE WITH ALL PERTINENT CODES AND REGULATIONS. IN THE EVENT OF DISCREPANCY, IMMEDIATELY NOTIFY THE PROFESSIONAL ENGINEER OF RECORD. DO NOT PROCEED WITH THE INSTALLATION IN AREAS OF DISCREPANCY UNTIL ALL SUCH DISCREPANCIES HAVE BEEN FULLY RESOLVED.

IT IS NOT THE INTENT OF THE DRAWINGS THAT EXISTING CONDITIONS BE ACCURATELY SHOWN. EXISTING PLUMBING WORK IS SHOWN TO LIMITED EXTENT ON DRAWINGS AND IS SHOWN FOR GENERAL REFERENCE ONLY. LOCATIONS AND INFORMATION WERE DERIVED FROM CURSORY SITE VISUAL OBSERVATIONS OR FROM DOCUMENTS THAT WERE PREPARED FOR PREVIOUSLY INSTALLED WORK WHEN AVAILABLE.

THE WORK COVERED BY THESE SPECIFICATIONS SHALL CONSIST OF PROVIDING ALL NEW MATERIAL, LABOR, EQUIPMENT, AND SERVICES NECESSARY FOR A COMPLETE PLUMBING INSTALLATION AS SPECIFIED HEREIN. WORK IN THIS SECTION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING ITEMS:

- PLUMBING FIXTURES
- WATER HEATERS

WHenever the words "CONTRACTOR" appear on plumbing drawings or in these specifications, it shall refer to the plumbing sub-contractor. Whenever the word "provide" appears in these documents, it shall be interpreted to mean "furnish and install".

COORDINATE ALL WORK WITH THE OWNER TO MINIMIZE INTERRUPTION OF BUILDING OPERATION.

COORDINATE THE INSTALLATION OF PLUMBING ITEMS WITH THE SCHEDULES FOR WORK OF ALL OTHER TRADES TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

THIS CONTRACTOR SHALL VERIFY AND SATISFY HIMSELF THAT ALL EQUIPMENT FURNISHED WILL PROPERLY FIT IN THE SPACE PROVIDED, THAT IT WILL FUNCTION PROPERLY, AND THAT ALL PARTS OF EQUIPMENT REQUIRING SERVICE ARE READILY ACCESSIBLE.

ALL PIPING SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING WALLS AND FRAMING SYSTEM. ALL VERTICAL RUNS SHALL BE HELD AGAINST WALLS, COLUMNS, ETC., AS POSSIBLE TO PERMIT MAKING OF PIPE JOINTS.

CONTRACTOR SHALL PROVIDE A GUARANTEE IN WRITTEN FORM STATING THAT ALL WORK SHALL BE FREE OF DEFECTS OR ERRORS, AND ALL EQUIPMENT, MATERIALS, OR PARTS FOR A PERIOD OF ONE YEAR FROM THE DATE OF OWNER'S FINAL ACCEPTANCE AND SHALL REPAIR, REVISE OR REPLACE AT NO COST TO THE OWNER ANY SUCH DEFECTS OCCURRING WITHIN THE GUARANTEE PERIOD.

CONTRACTOR SHALL ALSO STATE IN WRITTEN FORM THAT ANY ITEMS OR OCCURRENCES ARISING DURING THE GUARANTEE PERIOD SHALL BE ATTENDED TO IN A TIMELY MANNER AND WILL IN NO CASE EXCEED THREE (3) WORKING DAYS FROM DATE OF NOTIFICATION BY OWNER.

PROVIDE A COMPLETE INSTALLATION IN CONFORMANCE WITH THE FOLLOWING STANDARDS:

AGA: AMERICAN GAS ASSOCIATION
ASPE: AMERICAN SOCIETY OF PLUMBING ENGINEERS
NFPA: NATIONAL FIRE PROTECTION ASSOCIATION
ASTM: STANDARD BUILDING CODE
INTERNATIONAL PLUMBING CODE

CONTRACTOR SHALL DO ALL CUTTING AND PATCHING REQUIRED FOR INSTALLATION OF THIS WORK. ALL OPENINGS IN WALLS, FLOORS OR CEILINGS SHALL BE PROPERLY SEALED AND RESTORED IN KIND. FLASH AND COUNTERFLASH AT ROOF OPENINGS.

ALL EQUIPMENT SHALL BE LISTED AND LABELED, UNLESS OTHERWISE APPROVED.

ALL WIRING SHALL MEET THE REQUIREMENTS LISTED IN THE ELECTRICAL SPECIFICATIONS. ALL CONTROL AND INTERLOCK WIRING AND CONDUIT (120V OR 24V) SHALL BE BY THE PLUMBING CONTRACTOR.

EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE CONDITIONS OF LISTING AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THIS CODE.

CLEANING: THIS CONTRACTOR SHALL REMOVE FROM THE PREMISES ALL ACCUMULATION OF DIRT, DEBRIS, WASTE MATERIALS AND RUBBISH CAUSED BY HIS EMPLOYEES OR WORK, AT LEAST ONCE A WEEK, EXCEPT THAT COMBUSTIBLE MATERIALS SHALL BE REMOVED DAILY.

DURING PROGRESS OF THE WORK, MAINTAIN ON DRAWINGS AT THE SITE, AN ACCURATE RECORD OF THE INSTALLATION OF THE MECHANICAL SYSTEM, INDICATING ALL ITEMS WHICH HAVE BEEN CHANGED OR ADDED.

APPLY FOR AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED BY LOCAL AUTHORITY, FOR THE APPROVAL OF WORK.

A CERTIFICATE OF FINAL INSPECTION AND APPROVAL SHALL BE SUBMITTED WITH THE CONTRACTOR'S REQUEST FOR FINAL PAYMENT. NO FINAL PAYMENT WILL BE APPROVED WITHOUT THIS CERTIFICATE.

GUARANTEE ALL WORKMANSHIP, MATERIAL, AND EQUIPMENT AND REPLACE ANY FOUND DEFECTIVE WORK WITHOUT COST TO THE OWNER, FOR A PERIOD OF ONE YEAR AFTER FINAL ACCEPTANCE.

EXISTING CONDITIONS

DO NOT REUSE REMOVED PLUMBING MATERIALS UNLESS SPECIFICALLY INDICATED ON DRAWINGS. EXISTING SYSTEMS MAY BE UTILIZED ONLY TO THE EXTENT INDICATED ON DRAWINGS.

IF REQUIRED TO ACCOMMODATE CONSTRUCTION RELATED ACTIVITIES TEMPORARILY REMOVE, STORE IN PROTECTED LOCATION ON SITE, AND REINSTALL ADHESIVE PLUMBING EQUIPMENT, OR DEVICES THAT ARE TO REMAIN OR TO BE RELOCATED.

WHERE THE TERM "DEMOLITION" IS USED HEREIN, INTERPRET IT TO MEAN "DEMOLITION" OR "SELECTIVE DEMOLITION" WHERE APPLICABLE.

PROVIDE PLUMBING DEMOLITION WORK AS REQUIRED TO ACCOMMODATE PROJECT DEMOLITION AND AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. DISCONNECT AND REMOVE WORK TO BE ABANDONED, AND AS REQUIRED TO ACCOMMODATE WORK OF OTHER TRADES, IN AREAS AFFECTED BY THIS PROJECT.

LEGALLY DISPOSE OF MATERIALS TO SALVAGED OR RETAINED.

22 05 00 SUBMITTALS FOR PLUMBING

DESIGN BASIS MANUFACTURERS OF MATERIAL AND EQUIPMENT ARE SPECIFIED AND PLANS ARE DETAILED ACCORDING TO THIS MATERIAL. CONTRACTOR SHALL BASE HIS BID ON FURNISHING AND INSTALLING THIS MAKE OF MATERIAL AND EQUIPMENT.

SHOP DRAWINGS SHALL INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING: MAKE, MODEL NUMBER, DIMENSIONS, ELECTRICAL CHARACTERISTICS (RATING). SHOP DRAWINGS SHALL BEAR NAME OF PROJECT AND LOCATION.

THE MAKE, TYPE, AND FINISH OF ALL MATERIALS, EQUIPMENT AND APPARATUS SHALL BE APPROVED BY THE ENGINEER/ARCHITECT IN WRITING BEFORE THE CONTRACTOR INSTALLS IT. ANY SUBSTITUTION FOR ANY SPECIFIED EQUIPMENT OR MATERIAL SHALL FIRST BE APPROVED BY THE ENGINEER/ARCHITECT IN WRITING.

SUBMIT SHOP DRAWINGS ON THE FOLLOWING ITEMS FOR REVIEW BEFORE FABRICATION OR SHIPMENT:

- PLUMBING FIXTURES
- WATER HEATERS

MAINTENANCE MANUALS: FURNISH THREE FINAL COPIES, INCLUDING WIRING DIAGRAMS, MAINTENANCE AND OPERATING INSTRUCTIONS, PARTS LISTINGS, AND COPIES OF OTHER SUBMITTALS INDICATED FOR INCLUSION.

ANY CHANGES TO ITEMS SPECIFIED MUST BE SUBMITTED AS A SUBSTITUTION, WITH COMPLETE DOCUMENTATION OF PRICE DIFFERENTIAL AND EQUIPMENT DETAILS.

1. CERTAIN MAKES OF MATERIALS AND EQUIPMENT ARE SPECIFIED AND DRAWINGS ARE DETAILED ACCORDING TO THIS MATERIAL. CONTRACTOR SHALL BASE HIS BID ON FURNISHING AND INSTALLING THE SPECIFIED MAKE AND MODEL OR THE "EQUIVALENT" MODEL OF ANOTHER OF THE SPECIFIED MANUFACTURERS WHICH MEETS ALL THE QUALIFICATIONS OF THE SPECIFIED ITEMS.
2. WHERE MORE THAN ONE MAKE OF MATERIAL OR EQUIPMENT IS SPECIFIED, THE CONTRACTOR SHALL STATE IN HIS BID WHICH MAKE HE PROPOSES TO FURNISH. SHOP DRAWING APPROVAL SHALL BE OBTAINED PRIOR TO SHIPMENT OF EQUIPMENT.
3. "EQUIVALENT" MATERIALS AND EQUIPMENT ARE THOSE OF ANOTHER WHICH MEET THE SAME STANDARDS OF PERFORMANCE, HAVE EQUAL OR BETTER MATERIALS OF CONSTRUCTION, AND EQUAL OR BETTER MAINTENANCE CHARACTERISTICS. ALL EQUIVALENTS MUST FIT THE SPACE PROVIDED IN THE BUILDING STRUCTURE, WHERE THE USE OF EQUIVALENTS RESULTS IN CHANGES, THIS CONTRACTOR SHALL BE RESPONSIBLE FOR SUCH CHANGES AND ANY COSTS RESULTING FROM THEM.
4. IF THE CONTRACTOR INTENDS TO USE EQUIPMENT OR MATERIALS NOT SPECIFIED, HE MUST RECEIVE APPROVAL FROM THE ENGINEER/ARCHITECT PRIOR TO THE AWARD OF THE CONTRACT. THIS PRIOR APPROVAL ONLY PERMITS SUBMITTAL OF A PARTICULAR MANUFACTURER'S EQUIPMENT IN GENERAL. THE SPECIFIED ITEM TO BE USED MUST AGAIN BE SUBMITTED FOR FINAL REVIEW AS SPECIFIED UNDER "SHOP DRAWINGS".

22 05 20 GENERAL DUTY VALVES

GENERAL

PROVIDE STOPS OR ISOLATION VALVES ON DOMESTIC WATER SUPPLIES TO ISOLATE HOT AND COLD WATER TO EACH FIXTURE, INCLUDING ALL EQUIPMENT AND EQUIPMENT PROVIDED BY OTHERS.

FIXTURES, ITEM OR UNITS FURNISHED BY THE MANUFACTURER WITH INTEGRAL STOPS OR STOPS SPECIFIED WITH THE FIXTURE ARE CONSIDERED TO BE PROPERLY VALVED AT THE FIXTURES.

ACCESS SHALL BE PROVIDED TO ALL VALVES.

VALVES ON DOMESTIC WATER PIPING SHALL BE BALL VALVES.

[BALL VALVES - 1 INCH AND SMALLER: 2-PIECE BODY, 600 PSI CWP, 150 PSI SWP, CAST BRONZE BODY, FULL PORT, TEFLON SEATS, BLOWOUT-PROOF STEM, ADJUSTABLE PACKING GLAND, CHROME PLATED BRONZE BALL, WITH SCREWED ENDS, AND VINYL-COVERED STEEL HANDLE. PROVIDE SOLDER ENDS. PROVIDE EXTENDED VALVE STEMS FOR VALVES USED ON INSULATED LINES. PROVIDE NIBCO SERIES 590.]

[BALL VALVES: 1-1/4 INCH TO 3 INCH: 3-PIECE BODY, 600 PSI CWP, 150 PSI SWP, CAST BRONZE BODY, CONVENTIONAL PORT, TEFLON SEATS, BLOWOUT-PROOF STEM, ADJUSTABLE PACKING GLAND, CHROME PLATED BRONZE BALL, SCREWED ENDS, AND VINYL-COVERED STEEL HANDLE. PROVIDE SOLDER ENDS. PROVIDE EXTENDED VALVE STEMS FOR VALVES USED ON INSULATED LINES. PROVIDE TO NIBCO SERIES 590.]

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND ARE LIMITED TO, THE FOLLOWING:
AMERICAN VALVE, INC.
CONBRACO INDUSTRIES, INC.; APOLLO VALVES.

CRANE CO.; CRANE VALVE GROUP; CRANE VALVES.
HAMMOND VALVE.
MILWAUKEE VALVE COMPANY.

NIBCO INC.
RED-WHITE VALVE CORPORATION.
WATTS REGULATOR CO.; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.

CHECK VALVES

SWING CHECK VALVES - CLASS 125, CAST BRONZE BODY AND CAP, HORIZONTAL SWING, Y-PATTERN, WITH A BRONZE DISC, AND HAVING THREADED OR SOLDER ENDS. PROVIDE SOLDER ENDS FOR DOMESTIC HOT AND COLD WATER SERVICE. PROVIDE NIBCO 5-413.

22 05 20 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

SUPPORT ALL PIPING AND EQUIPMENT BY HANGERS OR BRACKETS. PROVIDE STRUCTURAL STEEL MEMBERS WHERE REQUIRED TO SUPPORT PIPING AND EQUIPMENT. NO PORTION OF PIPING OR VALVES SHALL BE SUPPORTED BY EQUIPMENT.

DELEGATED DESIGN

FOR EQUIPMENT SUPPORTS, THIS CONTRACTOR SHALL RETAIN A QUALIFIED PROFESSIONAL ENGINEER TO PROVIDE SUPPORT CALCULATIONS OF STATIC AND DYNAMIC LOADING DUE TO OPERATING EQUIPMENT WEIGHT, SEISMIC AND WIND FORCES. THE SIGNED AND SEALED CALCULATIONS AND DETAILS SHALL BE SUBMITTED BY THE RETAINED PROFESSIONAL ENGINEER.

PIPING

PROVIDE HANGERS, SUPPORTS, CLAMPS AND ATTACHMENTS TO SUPPORT PIPING PROPERLY FROM BUILDING STRUCTURE. ARRANGE FOR GROUPING OF PARALLEL RUNS OF HORIZONTAL PIPING SUPPORTED TOGETHER ON FIELD-FABRICATED, HEAVY-DUTY TRAPEZE HANGERS WHERE POSSIBLE. WHERE PIPING OF VARIOUS SIZES IS SUPPORTED TOGETHER BY TRAPEZE HANGERS, SPACE HANGERS FOR SMALLEST PIPE SIZE OR PROVIDE INTERMEDIATE SUPPORTS FOR SMALLER DIAMETER PIPE AS SPECIFIED ABOVE FOR INDIVIDUAL PIPE HANGERS.

INDIVIDUAL PIPE HANGERS TO BE ANVIL INTERNATIONAL CLEVIS HANGER FIG. 260, ELEN.
ROD SIZES TO CONFORM TO THE FOLLOWING: 3/8" RODS FOR 3/4" TO 2" PIPE; 1/2" RODS FOR 2-1/2" TO 3" PIPE; 5/8" RODS FOR 4" TO 5" PIPE; 3/4" RODS FOR 6" PIPE.

HANGERS SHALL BE SIZED TO ALLOW INSULATION TO PASS THROUGH UNOBSTRUCTED, PROVIDE SADDLE SUPPORT FOR INSULATION AT ALL HANGERS.

HANGER SPACING FOR STEEL PIPING UNLESS OTHERWISE NOTED IS TO BE AS FOLLOWS: 1-1/4' OR SMALLER TO BE 8' ON CENTER; 1-1/2" TO 2" TO BE 10' ON CENTER; 2-1/2" AND LARGER TO BE 12' ON CENTER AND AT EACH CHANGE OF DIRECTION. HANGER SPACING FOR COPPER PIPE TO BE AS FOLLOWS: 1" OR SMALLER 6' ON CENTER; 1-1/4" OR LARGER 8' ON CENTER. HANGER SPACE FOR CPVC AND PVC PIPE TO BE AS FOLLOWS: 1" AND SMALLER TO BE 3' ON CENTER; 1-1/4" OR LARGER TO BE 4' ON CENTER.

PIPING SHALL ALSO BE SUPPORTED AT EACH CHANGE IN DIRECTION, VALVES AND EQUIPMENT.

22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PIPING

PROVIDE SELF-ADHESIVE PIPE LABELS WITH WHITE BACKGROUND AND BLACK LETTERING, CONTACT TYPE WITH PERMANENT ADHESIVE BACKING. INCLUDE IDENTIFICATION OF PIPING SERVICE USING SAME DESIGNATIONS OR ABBREVIATIONS AS USED ON THE DRAWINGS AND AN ARROW INDICATING FLOW DIRECTION.

EQUIPMENT

PROVIDE SELF-ADHESIVE PLASTIC EQUIPMENT LABELS WITH WHITE BACKGROUND AND BLACK LETTERING, CONTACT TYPE WITH PERMANENT ADHESIVE BACKING, 160 DEGREE F TEMPERATURE. INCLUDE EQUIPMENTS DRAWING DESIGNATION AND SPECIFICATION SECTION NUMBER WHERE EQUIPMENT IS SPECIFIED.

22 07 19 PLUMBING SYSTEM INSULATION

GENERAL

INSULATION SHALL BE LISTED AND LABELED PER ASTM E 84 FOR PLENUM INSTALLATIONS EMPLOYING SLIP ON TECHNIQUES. PROVIDE INSULATION MATERIALS, ACCESSORIES, AND FINISHES WITH SMOOTH, STRAIGHT, AND EVEN SURFACES, FREE OF VOIDS THROUGHOUT THE LENGTH OF PIPING INCLUDING FITTINGS, VALVES, AND SPECIALTIES.

SURFACE PREPARATION: CLEAN AND DRY SURFACES TO RECEIVE INSULATION. REMOVE MATERIALS THAT WILL ADVERSELY AFFECT INSULATION APPLICATION.

PIPING SYSTEMS REQUIRING INSULATION

INSULATE DOMESTIC COLD WATER PIPING, ASSOCIATED FITTINGS AND VALVES WITH FLEXIBLE ELASTOMERIC 1/2" WALL THICKNESS INSULATION.

INSULATE DOMESTIC HOT WATER PIPING, ASSOCIATED FITTINGS AND VALVES WITH 1" THICK FLEXIBLE ELASTOMERIC, 1" THICK MINERAL WOOL, 1-1/2" THICK FIBERGLASS INSULATION OR PER LOCAL ENERGY CODE, WHICHEVER GREATER.

INSULATE DOMESTIC HOT WATER RETURN PIPING, ASSOCIATED FITTINGS AND VALVES WITH 1" WALL THICKNESS INSULATION OR PER LOCAL ENERGY CODE, WHICHEVER GREATER.

INSULATE WASTE PIPING ABOVE CEILINGS THAT RECEIVE CONDENSATE WITH 1/2" WALL THICKNESS INSULATION. INSULATE EXPOSED SANITARY DRAINS, DOMESTIC WATER, DOMESTIC HOT WATER, AND STOPS FOR PLUMBING FIXTURES FOR PEOPLE WITH DISABILITIES.

FLEXIBLE ELASTOMERIC INSULATION

CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIALS. COMPLY WITH ASTM C 534, TYPE I FOR TUBULAR MATERIALS AND TYPE II FOR SHEET MATERIALS.

ADHESIVES, SEALERS, AND PROTECTIVE FINISHES: AS RECOMMENDED BY INSULATION MANUFACTURER FOR APPLICATIONS INDICATED.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND ARE LIMITED TO, THE FOLLOWING:
AEROFLEX USA, INC.; AEROCEL
ARMACEL LLC; AP ARMAFLEX.
K-FLEX USA; INSUL-LOCK, INSUL-TUBE, AND K-FLEX LS.

FIBERGLASS INSULATION

FIBERGLASS PIPING INSULATION: ASTM C 547, CLASS 1
ENCASE PIPE FITTINGS: INSULATION WITH ONE-PIECE PRE-MOLDED PVC FITTING COVERS.

VAPOR BARRIER MATERIAL: PAPER-BACKED ALUMINUM FOIL, EXCEPT AS OTHERWISE INDICATED, STRENGTH AND PERMEABILITY RATING EQUIVALENT TO ADJOINING PIPE INSULATION JACKETING.

STAPLES, BANDS, WIRES, AND CEMENT: AS RECOMMENDED BY INSULATION MANUFACTURER FOR APPLICATIONS INDICATED.

ADHESIVES, SEALERS, AND PROTECTIVE FINISHES: AS RECOMMENDED BY INSULATION MANUFACTURER FOR APPLICATIONS INDICATED.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND ARE LIMITED TO, THE FOLLOWING:
ARMSTRONG WORLD INDUSTRIES, INC.
OWENS-CORNING FIBERGLASS CORP.

KEENE CORP.

CERTIFIED:

JOHNS MANVILLE.

ADHESIVES

MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES AND FOR BONDING INSULATION TO ITSELF AND TO SURFACES TO BE INSULATED, UNLESS OTHERWISE INDICATED.

INSULATION FOR HANDICAP ACCESSIBLE FIXTURES

ALL HANDICAP LAVATORY P-TRAP AND ANGLE STOP ASSEMBLIES SHALL BE INSULATED WITH TRAP WRAP PROTECTIVE KIT MANUFACTURED BY PROFLO MODEL #P202WH. ABRASION RESISTANT, ANTI-MICROBIAL VINYL EXTERIOR COVER SHALL BE SMOOTH. FOR TRAPS, THE INSULATION SHALL HAVE A CLEANOUT NUT CAP TO ALLOW SERVICE TO THE TRAP WITHOUT DISASSEMBLY. FOR STOPS, THE INSULATION SHALL HAVE A LOCK LID THAT PREVENTS TAMPING BUT ALLOWS ACCESS WITHOUT REMOVAL OF THE INSULATION. FASTENERS SHALL REMAIN SUBSTANTIALLY OUT OF SIGHT.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS:
PROFLO
TRUBERO
PLUMBEREX

22 11 16 DOMESTIC WATER PIPING

GENERAL

INSTALL PIPING CONCEALED FROM VIEW UNLESS NOTED OTHERWISE, FREE OF SAGS AND BENDS. DO NOT ENCLOSE, COVER, OR PUT PIPING INTO OPERATION UNTIL IT HAS BEEN INSPECTED AND APPROVED BY AUTHORITIES HAVING JURISDICTION. CLEAN AND DISINFECT POTABLE DOMESTIC WATER PIPING USING APPROVED PROCEDURES BY AUTHORITIES HAVING JURISDICTION.

INSTALL AT RIGHT ANGLES; DIAGONAL RUNS ARE PROHIBITED UNLESS OTHERWISE SHOWN. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL. COORDINATE ALL PIPING WITH ALL OTHER TRADES. PROVIDE WATER PRESSURE REGULATORS WHERE NECESSARY TO LIMIT THE INCOMING WATER PRESSURE TO 80 PSI INSIDE THE BUILDING.

DOMESTIC WATER PIPING ABOVE GROUND:

HARD COPPER TUBE, ASTM B 88, TYPE L; WROUGHT-COPPER, SOLDER-JOINT FITTINGS; AND SOLDERED JOINTS.

SOLDER FILLER METALS: ASTM B 32, LEAD-FREE ALLOYS.

FLUX: ASTM B 813, WATER FLUSHABLE.

TYPE "L": COPPER PRESSURE-SEAL JOINT; AND PRESSURE-SEAL JOINT SYSTEMS.

CATHODIC PROTECTION

PROVIDE DIELECTRIC INSULATION AT POINTS WHERE COPPER OR BRASS PIPE COMES IN CONTACT WITH FERROUS PIPING, REINFORCING STEEL OR OTHER DISSIMILAR METAL IN STRUCTURE.

22 11 19 DOMESTIC WATER PIPING SPECIALTIES

REDUCED PRESSURE BACKFLOW PREVENTERS

BACKFLOW PREVENTER (2" AND SMALLER) - PROVIDE A REDUCED PRESSURE BACKFLOW PREVENTER ON WATER SERVICE MAIN WHERE THE WATER SERVICE ENTERS THE BUILDING. REDUCED PRESSURE BACKFLOW PREVENTER SHALL BE SIZED EQUAL TO THE SIZE OF THE WATER SERVICE AND CONFORM TO ASSE 1013. PIPE BACKFLOW PREVENTER DISCHARGE TO APPROVED PLACE OF DISPOSAL.

DUAL CHECK VALVE BACKFLOW PREVENTER

PROVIDE A DUAL CHECK VALVE BACKFLOW PREVENTER THAT COMPLIES WITH ASSE 1022 AT CONNECTION OF DOMESTIC WATER SUPPLY TO ANY PERMANENTLY CONNECTED CARBONATED BEVERAGE DISPENSER OR WHERE INDICATED IN THE CONTRACT DOCUMENTS.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH ASSE 1024 AT CONNECTION OF DOMESTIC WATER SUPPLY TO ANY POTABLE WATER DISPENSING EQUIPMENT SUCH AS ICE MAKERS, COFFEE MACHINES, TEA MACHINES, ESPRESSO MACHINES OR WHERE INDICATED IN THE CONTRACT DOCUMENTS.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND ARE LIMITED TO, THE FOLLOWING:
AMES FIRE & WATERWORKS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.

CONBRACO INDUSTRIES, INC.
FEBCO; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.

FLOMATIC CORPORATION.
WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.; WATTS REGULATOR COMPANY.

ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; WILKINS WATER CONTROL PRODUCTS.

BALANCING VALVES

PROVIDE BALANCING VALVES WHERE REQUIRED FOR PROPER BALANCING OF WATER SYSTEMS AS SHOWN ON THE CONTRACT DOCUMENTS.
BALANCING VALVES SHALL BE RED-WHITE VALVE CORPORATION MODEL 9517AB (NPT) OR MODEL 9519 (SOLDER). VALVE SHALL HAVE BRASS BODY, GLOBE VALVE REGULATION AND ISOLATION PROPERTIES, FIXED ORIFICE DESIGN FOR PRECISE MEASUREMENT, INTEGRAL MEMORY STOP TO ENSURE REPEATABLE SETTING, FULL SHUTOFF WITHOUT AFFECTING MEMORY SETTINGS, HIGH AND LOW PRESSURE METERING POINTS, PRECISION INDICATOR WINDOWS, RUGGED TOP SET HAND-WHEEL ASSEMBLY, PRESSURE RATING OF 300 PSI, AND TEMPERATURE RATINGS OF 15 DEG. F TO 260 DEG. F.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND ARE LIMITED TO, THE FOLLOWING:
CRANE CO.; CRANE VALVE GROUP; CRANE VALVES.

HAMMOND VALVE.

MILWAUKEE VALVE COMPANY.

NIBCO INC.

RED-WHITE VALVE CORP.

VACUUM BREAKERS

VACUUM BREAKERS SHALL BE WATTS MODEL LF288A FOR PIPING CONNECTIONS OR WATTS LFB SERIES FOR HOSE CONNECTIONS.

VACUUM BREAKERS SHALL COMPLY WITH ASSE 1001 FOR RIGID CONNECTIONS, ASSE 1011 FOR HOSE CONNECTIONS, BRONZE BODY AND THREADED CONNECTIONS WITH ROUGH BRONZE FINISH.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND LIMITED TO, THE FOLLOWING:
MIFAB, INC.
PRIER PRODUCTS, INC.

WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.; WATTS REGULATOR COMPANY.
ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; LIGHT COMMERCIAL PRODUCTS.

ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; WILKINS WATER CONTROL PRODUCTS.

PRESSURE REDUCING VALVES

PROVIDE PRESSURE REDUCING VALVE TO REGULATE INCOMING DOMESTIC WATER PRESSURE IN EXCESSIVE OF 80 PSIG. PRESSURE REDUCING VALVE SHALL BE WATTS MODEL LF2235, COMPLY WITH ASSE 1003, INITIAL WORKING PRESSURE OF 300 PSIG, INTEGRAL STRAINER, LEAD-FREE BRASS BODY WITH THREADED CONNECTIONS.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND LIMITED TO, THE FOLLOWING:
CASH ACME; A DIVISION OF RELIANCE WORLDWIDE CORPORATION.
CONBRACO INDUSTRIES, INC.

HONEYWELL INTERNATIONAL INC.

WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.; WATTS REGULATOR COMPANY.
ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; WILKINS WATER CONTROL PRODUCTS.

STRAINERS

PROVIDE LEAD-FREE WYE-PATTERN STRAINER WATTS MODEL LF5777S RATED FOR 125 PSIG MINIMUM, BRONZE BODY, THREADED CONNECTIONS, STAINLESS STEEL SCREEN WITH ROUND PERFORATIONS OF 0.020 INCH AND PIPE PLUG DRAIN. PROVIDE STRAINERS ON SUPPLY SIDE OF EACH PRESSURE REDUCING VALVE AND PUMP AND PUMP MANUFACTURERS.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND LIMITED TO, THE FOLLOWING:
MIFAB, INC.
PRIER PRODUCTS, INC.

WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.; WATTS REGULATOR COMPANY.
ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; LIGHT COMMERCIAL PRODUCTS.
ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; WILKINS WATER CONTROL PRODUCTS.

HOSE BIBBS

WHERE APPLICABLE AND POSSIBLE, INSTALL ALL HOSE BIBBS 24" 30" ABOVE FINISHED FLOOR TO FACILITATE FILLING OF MOP BUCKET WITHOUT A HOSE. FURNISH TO OWNER WITH RECEIPT ONE VALVE KEY FOR EACH KEY OPERATED HOSE BOB INSTALLED.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND LIMITED TO, THE FOLLOWING:
JOSAM COMPANY
MIFAB, INC.

SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.

TYLER PIPE; WADE DIV.

WATTS DRAINAGE PRODUCTS.

WOODFORD MANUFACTURING COMPANY; A DIVISION OF WCM INDUSTRIES, INC.

ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; LIGHT COMMERCIAL PRODUCTS.

ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE PRODUCTS.

WALL HYDRANTS

PROVIDE NON-FREEZE WALL HYDRANTS WOODFORD MODEL B-67 WITH CHROME FINISH ON BRASS CASTING WITH BOX AND HINGED DOOR. CONCEAL WITHIN INTERIOR PARTITIONS. FURNISH TO OWNER WITH RECEIPT ONE VALVE KEY FOR EACH KEY OPERATED WALL HYDRANT INSTALLED.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND LIMITED TO, THE FOLLOWING:
JOSAM COMPANY
MIFAB, INC.

SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.

TYLER PIPE; WADE DIV.

WATTS DRAINAGE PRODUCTS.

WOODFORD MANUFACTURING COMPANY; A DIVISION OF WCM INDUSTRIES, INC.

ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; LIGHT COMMERCIAL PRODUCTS.

ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE PRODUCTS.

TRAP-SEAL PRIMER DEVICE

THE PLUMBING CONTRACTOR SHALL PROVIDE TRAP PRIMERS FOR ALL FLOOR DRAINS. TRAP PRIMER SHALL BE MIFAB NR-500 TRAP PRIMER VALVE. PROVIDE ACCESS PANEL IN WALL OR CEILING FOR ALL CONCEALED TRAP PRIMERS. INSTALL TRAP SEAL PRIMER VALVES WITH OUTLET PIPING PITCHED DOWN TOWARD DRAIN TRAP A MINIMUM OF 1% AND CONNECT TO FLOOR DRAIN BODY. TRAP OR INLET FITTING COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO INSTALLATION.

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, AND LIMITED TO, THE FOLLOWING:
MIFAB, INC.
PRECISION PLUMBING PRODUCTS, INC.

SIoux CHIEF MANUFACTURING COMPANY, INC.

SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.

WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.; WATTS REGULATOR COMPANY.

WATER TAB METERS

DISPLACEMENT-TYPE WATER METERS