

ABBREVIATIONS

Table of abbreviations for HVAC and mechanical systems, including terms like AC (Air Conditioning), AFF (Above Finished Floor), and various units and materials.

MISCELLANEOUS SYMBOLS

Table of miscellaneous symbols including thermostat, humidistat, switch, VFD, and various diffuser types.

DUCTWORK SYMBOLS

Table of ductwork symbols showing double and single line representations for various duct types, sizes, and components like dampers and sensors.

NOTE: NOT ALL ABBREVIATIONS AND SYMBOLS INDICATED MAY APPEAR ON THESE CONTRACT DRAWINGS. THIS IS FOR REFERENCE ONLY.

PIPING SYMBOLS

Table of piping symbols for various valves, sensors, and pipe types, including shut-off valves, globe valves, and expansion joints.

GENERAL NOTES

- List of 25 general notes detailing construction requirements, material standards, and safety protocols for the HVAC system.



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Revisions table with columns for Description, Date, and No.

SEAL: (Blank space for seal)

MECHANICAL INFORMATION SHEET
WOODLANDS AT GREYSTONE
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CHESTER COUNTY, PA

Project information table with fields for Project number, date, scale, sheet no., Drawn by, Author, chkd by, Checker, and Approver.

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MECHANICAL SPECIFICATIONS

SCOPE OF WORK

CONTRACTOR SHALL VISIT SITE TO DETERMINE EXISTING CONDITIONS. SUBMISSION OF PROPOSAL SHALL CONSIDER AN ACKNOWLEDGEMENT BY THE CONTRACTOR THAT THE CONTRACTOR HAS VISITED AND EXAMINED THE SITE.

FEATURES AS INDICATED ARE BELIEVED TO BE REASONABLY CORRECT BUT ARE NOT GUARANTEED. WHERE CONDITIONS AT PROJECT SITE DO NOT AGREE EXACTLY WITH CONDITIONS AS NOTED, THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY FOR SAID DISCREPANCY.

NO EXTRA PAYMENT WILL BE ALLOWED THE CONTRACTOR FOR EXTRA WORK CAUSED BY FAILURE TO VISIT, EXAMINE AND CLARIFY.

THE SCOPE OF MECHANICAL WORK INCLUDED IN THIS CONTRACT SHALL INCLUDE COMPLETE MECHANICAL SYSTEMS, INCLUDING BUT NOT LIMITED TO BUILDING HVAC SYSTEMS AND RELATED AUTOMATIC TEMPERATURE CONTROLS, AND SUPPORTS, ETC. AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN. ANY WORK REASONABLY INFERRABLE FROM THE DRAWINGS AND SPECIFICATIONS, AS REQUIRED TO RESULT IN A COMPLETE INSTALLATION AND THE INTENDED OPERATION AND PERFORMANCE OF THE SYSTEMS, SHALL BE INCLUDED IN THE BASE BID EXCEPT WHERE THERE IS SPECIFIC REFERENCE TO EXCLUSION AND INCORPORATION IN OTHER QUOTATIONS.

CONTRACT DRAWINGS

CONTRACT DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE RELATION OF PIPING, DUCTWORK, CONNECTIONS, AND EQUIPMENT. THE DRAWINGS DO NOT INDICATE ALL OFFSETS, ELBOWS, AND FITTINGS THAT MAY BE REQUIRED. THEREFORE, THE CONTRACTOR SHALL CAREFULLY INVESTIGATE THE STRUCTURAL AND FINISH CONDITIONS AFFECTING THE WORK AND ACTUAL EQUIPMENT PROVIDED. THE CONTRACTOR SHALL FURNISH ALL OFFSETS, ELBOWS, FITTINGS, HANGERS, AND ACCESSORIES AS MAY BE REQUIRED TO MEET THESE CONDITIONS AT NO ADDITIONAL COST TO THE OWNER.

DO NOT SCALE DRAWINGS. CONTRACTOR SHALL CHECK CONDITIONS AT THE SITE FOR DIMENSIONS AND SIZES PERTAINING TO THE STRUCTURES. DO NOT DEVIATE FROM THE DRAWINGS WITHOUT PRIOR APPROVAL.

GENERAL STANDARDS OF MATERIALS

EQUIPMENT AND MATERIALS, UNLESS SPECIFICALLY INDICATED OTHERWISE, SHALL BE NEW AND OF FIRST QUALITY, PRODUCED BY MANUFACTURERS WHO HAVE BEEN REGULARLY ENGAGED IN THE MANUFACTURE OF THESE PRODUCTS FOR A PERIOD OF NOT LESS THAN FIVE YEARS.

NOTE THAT WHERE SPECIFIC MANUFACTURERS' PRODUCTS ARE INDICATED ON THE DRAWINGS, THE ASSOCIATED SYSTEMS HAVE BEEN DESIGNED ON THE BASIS OF THAT PRODUCTS PHYSICAL CHARACTERISTICS. WHERE SPECIFIC MANUFACTURERS' PRODUCTS ARE NOT INDICATED ON THE DRAWINGS AND MORE THAN ONE MANUFACTURER IS NAMED IN THE SPECIFICATIONS, THE ASSOCIATED SYSTEMS HAVE BEEN DESIGNED ON THE BASIS OF THE FIRST-NAMED MANUFACTURER'S PRODUCT WHEN RELATED TO MODIFICATIONS TO THE SYSTEMS AND/OR STRUCTURE REQUIRED BY THE USE OF THAT PRODUCT SHALL BE PAID BY THE CONTRACTOR.

MATERIALS FURNISHED SHALL BE DETERMINED SAFE BY A NATIONALLY RECOGNIZED TESTING ORGANIZATION, SUCH AS INDEWRITERS' LABORATORIES, INC., OR FACTORY MUTUAL ENGINEERING CORPORATION, AND MATERIALS SHALL BE LABELED, CERTIFIED OR LISTED BY SUCH ORGANIZATIONS.

WORKMANSHIP AND MATERIALS SHALL BE GUARANTEED ONE YEAR FROM THE OWNER'S ACCEPTANCE AND START-UP. DURING THIS PERIOD, THIS CONTRACTOR AGREES TO MAKE WHATEVER ADJUSTMENTS ARE NEEDED TO HIS INSTALLATION, OR REPLACE ANY MATERIAL OR EQUIPMENT THAT PROVES TO BE UNSATISFACTORY. ALL GUARANTEES SHALL BE IN ADDITION TO EXPRESSED GUARANTEES OR STANDARD WARRANTIES OR MANUFACTURER'S AND/OR SUPPLIERS.

INSTALLATION OF HVAC SYSTEMS SHALL BE IN COMPLIANCE WITH THE CURRENT INTERNATIONAL MECHANICAL CODE, NFPA, LOCAL MUNICIPAL CODES, AND AS PER MANUFACTURER'S AND UTILITIES RECOMMENDATIONS.

THE INSTALLATION OF ALL GAS PIPING SHALL BE IN ACCORDANCE WITH NFPA 54, INTERNATIONAL FUEL GAS CODE, AMERICAN GAS ASSOCIATION AND THE LOCAL GAS COMPANY.

CODES, PERMITS AND INSPECTIONS

MATERIALS FURNISHED AND WORK INSTALLED SHALL COMPLY WITH CURRENTLY ADOPTED INTERNATIONAL MECHANICAL CODE, THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS, THE REQUIREMENTS OF THE LOCAL UTILITY COMPANIES, AND THE REQUIREMENTS OF GOVERNMENTAL DEPARTMENTS OR AUTHORITIES HAVING JURISDICTION. MATERIALS AND EQUIPMENT FURNISHED FOR THE ELECTRICAL PORTION OF THE MECHANICAL SYSTEMS SHALL BEAR THE APPROVAL LABEL OF OR SHALL BE LISTED BY THE UNDERWRITERS' LABORATORIES, INC.

THE CONTRACTOR SHALL PAY ALL FEES AND OBTAIN AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED BY ANY AUTHORITY HAVING JURISDICTION IN CONNECTION WITH HIS WORK. CERTIFICATES OF INSPECTION SHALL BE DELIVERED TO THE ARCHITECT. FINAL PAYMENT IS CONTINGENT UPON DELIVERY OF SUCH CERTIFICATES TO ARCHITECT.

QUIET OPERATION AND VIBRATION CONTROL

EQUIPMENT AND ASSOCIATED ITEMS SHALL OPERATE UNDER CONDITIONS OF LOAD WITHOUT SOUND OR VIBRATION DEEMED OBJECTIONABLE BY THE ENGINEER/ARCHITECT OWNER. IN THE CASE OF MOVING EQUIPMENT, SOUND OR VIBRATION NOTICEABLE OUTSIDE OF THE ROOM IN WHICH IT IS INSTALLED, OR ANNOYINGLY NOTICEABLE WITHIN THE ROOM IN WHICH IT IS INSTALLED, SHALL BE DEEMED OBJECTIONABLE. SOUND OR VIBRATION DEEMED OBJECTIONABLE SHALL BE CORRECTED IN AN APPROVED MANNER AT NO EXTRA COST TO THE OWNER. VIBRATION CONTROL SHALL BE PROVIDED BY MEANS OF APPROVED VIBRATION ISOLATORS AND INSTALLED IN ACCORDANCE WITH THE ISOLATOR MANUFACTURERS' RECOMMENDATIONS.

ALL ROTATING MECHANICAL EQUIPMENT AND ITS ASSOCIATED PIPING AND DUCTWORK SHALL BE PROVIDED WITH VIBRATION ISOLATORS.

COORDINATION

COORDINATE AND FURNISH TO THE OWNER, IN WRITING, ANY INFORMATION NECESSARY TO PERMIT THE WORK TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE INTERFERENCE OR DELAY.

ACCESSIBILITY

LOCATE EQUIPMENT WHICH MUST BE SERVICED, OPERATED OR MAINTAINED IN FULLY ACCESSIBLE POSITIONS. EQUIPMENT REQUIRING ACCESS SHALL INCLUDE, BUT IS NOT NECESSARILY LIMITED TO VALVES, VOLUME DAMPERS, TRAPS, CLEAN OUTS, MOTORS, FIRE DAMPERS, CONTROLLERS, AND DRAIN POINTS.

DEMOLITION

THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF EXISTING EQUIPMENT, DUCTWORK, PIPING AND CONTROLS IN THE EXISTING BUILDING WHICH IS SHOWN TO BE REMOVED ON THE DRAWINGS OR WHICH IS IN CONFLICT WITH THE NEW WORK. FURNISH ALL LABOR, EQUIPMENT HAULING, RIGGING, SCAFFOLDING, ETC. NECESSARY FOR THE REMOVAL PHASE OF THE PROJECT.

THE DEMOLITION PLAN AS SHOWN IS NOT TO BE CONSIDERED ALL INCLUSIVE BUT IS TO BE A GENERAL GUIDE TO THE SCOPE OF THE DEMOLITION. ALL DEMOLITION MUST BE PERFORMED AS REQUIRED TO BRING THE AREA SHOWN TO A STATE WHERE THE NEW CONSTRUCTION WORK CAN BE ACCOMPLISHED AS SHOWN ON THESE CONSTRUCTION DOCUMENTS.

CONTINUITY OF SERVICES

ALL REMOVAL WORK AND INSTALLATION OF NEW EQUIPMENT REQUIRING SYSTEM SHUTDOWN SHALL BE COORDINATED WITH THE OWNER. PERIODS OF SHUT-DOWN SHALL BE MINIMAL AND ALL NEW WORK SHALL BE PLANNED AND SCHEDULED TO ACCOMPLISH AS SHUT-DOWNS AS POSSIBLE.

ALL CONSTRUCTION AND REMOVAL WORK SHALL BE PERFORMED IN PHASES DETAILED BY THE ARCHITECT AND EXISTING SYSTEMS ARE TO BE KEPT IN OPERATION AS THE WORK PROGRESSES. ALL REMOVED EQUIPMENT SHALL BE THE PROPERTY OF THE OWNER OR DISPOSED OF BY THE CONTRACTOR AS DIRECTED BY THE OWNER.

STORAGE

EACH CONTRACTOR SHALL PROVIDE SUITABLE STORAGE FACILITY IN THE LOCATION ASSIGNED THEM AT THE SITE FOR THEIR MATERIALS. WHERE PARTS OF THE BUILDING ARE USED FOR SUCH STORAGE, THEY SHALL BE LEFT IN CONDITION SATISFACTORY TO THE ENGINEER.

ALL MATERIALS DELIVERED ON THE PREMISES OR MATERIALS STORED AT THE CONTRACTOR'S PLACE OF BUSINESS OR IN WAREHOUSES, WHICH ARE TO FORM A PART OF THE WORK AND FOR WHICH THE CONTRACTOR HAS SUBMITTED AN APPLICATION FOR PAYMENT, SHALL BE CONSIDERED THE PROPERTY OF THE OWNER AND SHALL NOT BE REMOVED, SOLD, OR USED FOR OTHER PURPOSES WITHOUT HIS CONSENT.

THE CONTRACTOR SHALL REMOVE ALL HIS SURPLUS MATERIALS AFTER COMPLETION OF THE WORK.

CUTTING AND PATCHING

IN NEW CONSTRUCTION, THE CONTRACTOR SHALL GIVE THE GENERAL CONTRACTOR COMPLETE INFORMATION AS TO SIZE OF OPENINGS REQUIRED IN FLOORS AND WALLS, ETC., SO THAT SUCH OPENINGS MAY BE PROVIDED AS THE PROJECT PROGRESSES.

IF OPENINGS ARE OMITTED OR ARE INCORRECT THROUGH FAILURE OF THE CONTRACTOR TO FOLLOW THESE INSTRUCTIONS, THE CONTRACTOR SHALL AT HIS OWN EXPENSE, ENGAGE THE TRADE WHICH ORIGINALLY INSTALLED THE WORK, TO CUT AND PATCH TO THE SATISFACTION OF THE ARCHITECT.

ALL CUTTING AND PATCHING IN CONNECTION WITH THIS CONTRACT SHALL BE DONE BY THE CONTRACTOR WITH MECHANICS EXPERIENCED IN THEIR RESPECTIVE LINES OF WORK. ALL PATCHING SHALL MATCH ADJACENT FINISHES.

CLEANING

AT THE COMPLETION OF THE WORK, ALL PARTS OF THE INSTALLATION SHALL BE THOROUGHLY CLEANED. ALL EQUIPMENT SHALL BE LEFT IN CONDITION FOR USE.

ELECTRICAL

ANY ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE.

THE MECHANICAL CONTRACTOR SHALL ENSURE THAT ALL EQUIPMENT PROVIDED IS COMPATIBLE WITH THE ELECTRICAL SYSTEMS USED.

ALL POWER WIRING FROM PANEL TO DISCONNECT SWITCH SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR.

PROVIDE TEMPERATURE CONTROL WIRING, INTERLOCKING WIRING, AND EQUIPMENT CONTROL WIRING FOR THE EQUIPMENT PROVIDED UNDER THIS CONTRACT. ALL CONTROL WIRING SHALL BE 24 VOLT, UNLESS OTHERWISE NOTED.

FURNISH FUSES (FOR INSTALLATION BY THE ELECTRICAL CONTRACTOR) FOR EQUIPMENT PURCHASED UNDER THIS DIVISION OF THE SPECIFICATION.

DISCONNECT SWITCHES

PROVIDE DISCONNECT SWITCHES WHERE NOTED ON SCHEDULES.

TESTING, ADJUSTING, AND BALANCING

THE CONTRACTOR SHALL EMPLOY A BALANCING CONTRACTOR SPECIALIZING IN TOTAL SYSTEM AIR BALANCING, TESTING, AND COMMISSIONING. THIS BALANCING CONTRACTOR SHALL BE CERTIFIED BY ASSOCIATED AIR BALANCE COUNCIL (AABC) OR NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) AND SHALL PROVIDE ALL LABOR, ENGINEERING AND TEST EQUIPMENT REQUIRED TO ADJUST AND BALANCE ALL HEATING, VENTILATING, AIR CONDITIONING, AND EXHAUST SYSTEMS HEREINAFTER SPECIFIED. ALL PERSONNEL INVOLVED IN THE EXECUTION OF THE WORK UNDER THE BALANCING CONTRACT SHALL BE EXPERIENCED AND FACTORY TRAINED SPECIFICALLY IN THE TOTAL BALANCING OF MECHANICAL SYSTEMS, AS WELL AS BEING REGULAR EMPLOYEES OF THE BALANCING CONTRACTOR.

THE BALANCING CONTRACT SHALL INCORPORATE THE FOLLOWING:
INTERNATIONAL MECHANICAL CODE, THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS AND SPECIFIED.
RECORD ALL TEST DATA AND SUBMIT FIVE COPIES UPON COMPLETION OF THE BALANCING CONTRAST TO THE OWNER OR HIS REPRESENTATIVE.
INSTALL AT EACH PIECE OF MECHANICAL EQUIPMENT A "DATA REGISTER" SHOWING ALL SIGNIFICANT OPERATING TEMPERATURES, PRESSURES, AMPERES, VOLTAGE, BRAKE HORSEPOWER, ETC. "DATA REGISTER" TO BE ENCLOSED IN VINYL/HOLDER SECURELY ATTACHED TO THE EQUIPMENT OR WALL IN THE IMMEDIATE AREA.

ALL TEST EQUIPMENT SHALL BE FURNISHED BY THE BALANCING CONTRACTOR AND REMAINS HIS PROPERTY. ALL INSTRUMENTS SHALL HAVE BEEN CALIBRATED RECENTLY AND VERIFICATION OF CALIBRATION SHALL BE PROVIDED WITH SUBMITTAL DATA.

TESTING AND BALANCING SHALL NOT BEGIN UNTIL THE SYSTEM HAS BEEN COMPLETED AND IS IN FULL WORKING ORDER WITH ALL FILTERS INSTALLED IN AIR SYSTEMS AND STRAINERS HAVE BEEN CLEANED IN HYDRONIC SYSTEMS. THE CONTRACTOR SHALL PUT ALL HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS AND EQUIPMENT INTO FULL OPERATION. CORRECT OPERATION OF EQUIPMENT AND SYSTEM COMPONENTS, AND CLEANLINESS OF PIPING AND DUCTWORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

ADJUST ALL SYSTEMS TO PLUS OR MINUS 10 PERCENT OF THE FIGURES INDICATED ON THE DRAWINGS.

DUCTWORK

DUCTWORK, FITTINGS, REINFORCEMENT, HANGERS, ETC., SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF SMACNA STANDARDS. SIZES SHOWN ON DRAWINGS SHALL BE CLEAR INSIDE DIMENSIONS. ALL DUCTWORK SHALL BE GALVANIZED STEEL WITH EXTERNAL INSULATION UNLESS NOTED OTHERWISE.

SQUARE ELBOWS SHALL HAVE TURNING VANES. DUCTS SHALL BE SEALED AIR TIGHT TO SMACNA CLASS A. DUCT DEVICES SHALL BE CONSTRUCTED OF THE SAME MATERIAL AS THE DUCT IN WHICH THEY ARE INSTALLED. SUPPLY AIR, OUTSIDE AIR, RETURN AIR, AND EXHAUST AIR DUCTWORK SHALL BE GALVANIZED STEEL. DUCTWORK SHALL BE CONSTRUCTED FOR PRESSURES UP TO 2 INCHES W.G. UNLESS NOTED OTHERWISE.

DUCTWORK SHALL BE MECHANICALLY JOINTED AND SEALED WITH PRECISION No. EZ6010 DUCT DEALANT OR APPROVED EQUIVILANT.

DUCT ACCESSORIES

BALANCING DAMPERS:
PROVIDE MANUAL BALANCING DAMPERS AS NOTED ON THE DRAWINGS TO PROPERLY BALANCE THE AIR SYSTEMS. CONSTRUCTION OF DAMPERS SHALL CONFORM TO SMACNA STANDARDS FOR THE INTENDED OPERATING PRESSURE RANGE. DAMPERS SHALL BE RUSKIN MODEL MD35 OR EQUAL. BALANCING DAMPERS SHALL BE OF THE SAME MATERIAL AS THE DUCT IN WHICH THEY ARE INSTALLED. DAMPERS SHALL BE 2 GAGES HEAVIER THAN THE DUCTWORK IN WHICH THEY ARE INSTALLED. DAMPERS IN SQUARE OR RECTANGULAR DUCTS SHALL BE MULTIPLE OPPOSED BLADE TYPE. DAMPERS SHALL BE COMPLETE WITH LOCKING QUADRANTS ON STAND-OFF MOUNTING BRACKETS, BASES, OR ADAPTERS. DAMPERS SHALL BE OPPOSED BLADE TYPE. BLADES SHALL NOT EXCEED 6 INCHES IN WIDTH. DAMPERS SHALL BE COMPLETE FACTORY MANUFACTURED AND ASSEMBLED UNITS. CONTRACTOR FABRICATED DAMPERS ARE NOT ACCEPTABLE.

SPIN COLLARS:
SPIN COLLARS SHALL BE FABRICATED OF THE SAME MATERIAL AS THE DUCT IN WHICH THEY ARE INSTALLED. SPIN COLLARS SHALL BE COMPLETE WITH AN AIR EXTRACTOR AND A BALANCING DAMPER WITH A POSITIVE LOCKING DEVICE FOR EASY READJUSTMENT. SPIN COLLARS SHALL INCLUDE STAND-OFF MOUNTING BRACKETS, BASES, OR ADAPTER FOR LOCKING QUADRANT MOUNTING ON EXTERNALLY INSULATED DUCTS.

FLEXIBLE DUCTS:
INSULATED FLEXIBLE DUCTS SHALL BE TWO PLY VINYL FILM SUPPORTED BY HELICAL WOUND SPRING STEEL WIRE. FIBERGLASS INSULATION POLYETHYLENE VAPOUR BARRIER FILM WITH 10 INCHES WG POSITIVE AND 2.0 INCHES WG NEGATIVE PRESSURE RATING. PROVIDE DRAW BANDS AS REQUIRED FOR INSTALLATION. FLEXIBLE DUCTS SHALL BE INSTALLED TO PROVIDE UNOBSTRUCTED PASSAGE FOR AIR FLOW. ELBOWS SHALL BE MADE WITH AN INSIDE RADIUS EQUAL TO THE DUCT DIAMETER. HANGER AND SADDLE MATERIAL IN CONTACT WITH THE FLEXIBLE DUCT SHALL BE OF SUFFICIENT WIDTH TO PREVENT ANY RESTRICTION OF THE INTERNAL DIAMETER OF THE DUCT WHEN THE WEIGHT OF THE SUPPORTED SECTION RESTS ON THE HANGER OR SADDLE MATERIAL. FLEXIBLE DUCTWORK LENGTHS SHALL NOT EXCEED EIGHT FEET IN LENGTH. MATERIAL SHALL BE NFPA APPROVED.

FLEXIBLE CONNECTIONS:
CONNECTIONS AT FAN AND AIR SUPPLY UNITS, BOTH AT INLET AND DISCHARGE, SHALL BE MADE WITH FLEXIBLE MATERIAL SO AS TO PROHIBIT THE TRANSFER OF VIBRATION FROM FANS TO CONNECTING DUCTWORK. WITHOUT AIR LEAKAGE, THE FLEXIBLE MATERIAL SHALL HAVE SUFFICIENT SLACK SO AS TO PREVENT TEARING DUE TO FAN MOVEMENT.

MOTORIZED DAMPERS:
MOTORIZED DAMPERS SHALL BE RUSKIN MODEL CD35 OR EQUIVALENT WITH BELIMO ACTUATOR MODEL AF 24. END SWITCH SHALL BE 24V.

ACCESS DOORS

FURNISH EACH ACCESS DOOR ASSEMBLY MANUFACTURED AS AN INTEGRAL UNIT, COMPLETE WITH ALL PARTS AND READY FOR INSTALLATION AS REQUIRED. INSTALL ACCESS DOORS WHERE INDICATED AND/OR DETAILED.

EQUIPMENT

INSTALL HVAC EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. ALL EQUIPMENT SHALL BE AS SPECIFIED OR NOTED ON DRAWINGS AND SCHEDULES.

EQUIPMENT AND PIPING IDENTIFICATION

ALL MECHANICAL EQUIPMENT SHALL BE IDENTIFIED BY THE NAME AND IDENTIFICATION SHOWN IN THE SCHEDULES ON THE DRAWINGS. TAGS SHALL BE 1-1/2 INCHES BY 4 INCHES ENGRAVED ALUMINUM NAMEPLATES WITH BLACK ENAMEL BACKGROUND AND NATURAL ALUMINUM BORDER AND LETTERS. SIZE OF LETTERS SHALL BE SELECTED TO SUIT EACH APPLICATION. NAMEPLATES SHALL BE SECURELY AND PERMANENTLY MOUNTED.

ALL PIPING SHALL BE IDENTIFIED BY TYPE AND DIRECTION OF FLOW. PIPE IDENTIFICATION SHALL BE SELF-ADHERING STRIPS PLACED ON PIPING OR INSULATION AS MANUFACTURED BY SETON CORP. OR APPROVED EQUIVILANT. PIPE IDENTIFICATION SHALL BE PLACED AT MAXIMUM 20 FOOT INTERVALS ON STRAIGHT PIPE, AT EACH EQUIPMENT CONNECTION, AND AT EACH CHANGE IN DIRECTION.

GRILLES/REGISTERS/DIFFUSERS

GRILLES, REGISTERS, AND DIFFUSERS SHALL BE FACTORY FABRICATED AND CONSTRUCTED OF STEEL OR ALUMINUM. DIFFUSERS SHALL HAVE FIXED OR ADJUSTABLE AIR DISCHARGE PATTERN AS SCHEDULED.

GRILLES, REGISTERS, AND DIFFUSERS BORDERS SHALL BE COORDINATED WITH CEILING GRID OR CEILING TYPE TO INSURE FLUSH FIT WITHOUT GAPS AROUND BORDER. COORDINATE ALL GRID COLORS WITH ARCHITECT PRIOR TO RELEASE.

GRILLES, REGISTERS, AND DIFFUSERS SHALL BE AS SCHEDULED.

FILTER

HEATING AND AIR CONDITIONING SYSTEMS OF THE CENTRAL TYPE SHALL BE PROVIDED WITH APPROVED AIR FILTERS. FILTERS SHALL BE INSTALLED IN THE RETURN AIR SYSTEM UPSTREAM FROM ANY HEAT EXCHANGER OR COIL IN AN APPROVED CONVENIENT LOCATION. LIQUID ADHESIVE COATINGS USED ON FILTERS SHALL HAVE A FLASH POINT NOT LOWER THAN 25 °F.

INSULATION

INSULATION SHALL BE PROVIDED CONTINUOUSLY THROUGH SLEEVES AND OPENINGS.

TESTING OF DUCTWORK OR PIPING SHALL BE COMPLETE BEFORE INSULATION ON THE EXTERIOR OF THE DUCT OR PIPE IS APPLIED.

INSULATION OR ACOUSTIC DUCT LINER (SEE BELOW) SHALL BE SEAP AT FIRE DAMPERS AND AT ELECTRIC DUCT HEATERS. ALL EXPOSED ENDS OF INSULATION SHALL BE STOLED OR LAPPED WITH VAPOUR BARRIER.

ALL INTERIOR SUPPLY AND RETURN DUCTWORK SHALL BE EXTERNALLY INSULATED WITH 1.5 POUND DENSITY JACKETED FIBERGLASS BATT INSULATION, 1-1/2" THICK, WITH A MINIMUM INSTALLED R-VALUE OF 5.0. ALL DUCTWORK INSULATION SHALL HAVE A FLAME SPREAD RATING OF 25 OR LESS, AND A SMOKE DEVELOPED RATING OF 50 OR LESS IN ACCORDANCE WITH ASTM E84.

ALL OUTSIDE AIR DUCTWORK SHALL BE EXTERNALLY INSULATED WITH 3/4 POUND DENSITY JACKETED FIBERGLASS BATT INSULATION, 1-1/2" THICK WITH A MINIMUM INSTALLED R-VALUE OF 5.6. ALL DUCTWORK INSULATION SHALL HAVE A FLAME SPREAD RATING OF 25 OR LESS, AND SMOKE DEVELOPED RATING OF 50 OR LESS IN ACCORDANCE WITH ASTM E84.

FOR ALL OUTSIDE DUCTWORK OR DUCTWORK EXPOSED TO AMBIENT CONDITIONS IN MECHANICAL ROOMS, PENTHOUSES, ETC., INCREASE INSULATION THICKNESS TO PROVIDE A MINIMUM R-VALUE OF 8.0.

PIPE INSULATION SHALL CONFORM TO RECOMMENDATIONS OF THE NFPA AND SHALL HAVE COMPOSITE FIRE AND SMOKE HAZARD RATINGS AS TESTED BY PROCEDURE ASTM-84, NFPA 255, OR UL-723, NOT EXCEEDING FLAME SPREAD 25 AND SMOKE DEVELOPED 50.

ALL CONDENSATE PIPING SHALL BE INSULATED WITH ARMAFLEX AP 1/2" CLOSED-CELL FOAM INSULATION OR APPROVED EQUIVILANT.

ALL REFRIGERATION PIPING SHALL BE INSULATED WITH ARMAFLEX AP 1-1/2" CLOSED-CELL FOAM INSULATION OR APPROVED EQUIVILANT.

FOR ALL PIPING EXPOSED TO AMBIENT CONDITIONS IN MECHANICAL ROOMS, PENTHOUSES OR OUTSIDE INCREASE INSULATION THICKNESS BY 1/2" (NOTE: CHILLED WATER PIPING SHALL BE INCREASED BY 1" WHEN EXPOSED TO AMBIENT CONDITIONS).

SEAL ALL BUILDING ENVELOPE PENETRATIONS WITH SHEET METAL FLASHING AND SILICONE CAULKING.

CONTROLS

PROGRAMMABLE THERMOSTATS SHALL BE HONEYWELL T8R220U1003 VISIONPRO 8000 DIGITAL PROGRAMMABLE THERMOSTAT OR EQUAL. THERMOSTATS SHALL PROVIDE AUTOMATIC CHANGEOVER FROM HEATING TO COOLING, AND FROM OCCUPIED TO UNOCCUPIED SETTINGS. THERMOSTATS SHALL BE 7-DAY PROGRAMMABLE. PROVIDE AUXILIARY CONTACT FOR CONTROL OF MOTORIZED OUTSIDE AIR DAMPER. PROVIDE ALL REQUIRED RELAYS AND CONTACTORS REQUIRED FOR SEQUENCE OF OPERATION.

CONTRACTOR TO PROVIDE ALL CONTROLS, SENSORS, THERMOSTATS, CONTRACTORS, RELAYS AND ASSOCIATED WIRING TO PROVIDE A FULL OPERATING CONTROL SYSTEM. THE CONTROL MANUFACTURER SHALL GUARENTEE ALL EQUIPMENT AND SYSTEM FOR A PERIOD OF TWO YEARS AND SHALL KEEP THE CONTROL SYSTEM IN ADJUSTMENT THROUGHOUT THE FIRST COMPLETE HEATING AND COOLING SEASONS, WITHOUT EXPENSE TO THE OWNER.

PIPES AND ACCESSORIES

VALVES 2-1/2" AND SMALLER FOR SHUT-OFF AND BALANCING SERVICE, SHALL BE BALL VALVES.

ALL CONDENSATE DRAIN PIPING SHALL BE COPPER ASTM B-88 HARD TEMPER TYPE (L). FITTINGS SHALL BE WROUGHT COPPER SOLDER JOINT, ANSI B16.18.

REFRIGERANT PIPING:
ALL REFRIGERANT PIPING SHALL BE HARD-DRAWN (TEMPERED) COPPER TUBE, TYPE L ACR. ALL PIPING JOINTS SHALL BE BRAZED WITH SILFOS 15 FILLER METAL AND THE PIPING CHARGED WITH DRY NITROGEN WHILE CONSTRUCTING THE JOINTS. ALL PIPING SHALL BE SUPPORTED WITH CUSHI CLAMPS AND STRUT AS MANUFACTURED BY B-LINE, INC. OR APPROVED EQUAL. ALL SUCTION PIPING SHALL BE INSULATED. ALL REFRIGERANT PIPING SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE REFRIGERATION EQUIPMENT MANUFACTURER AND SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO: FLEXIBLE CONNECTIONS, VALVES, RELIEF VALVES, EXPANSION VALVES, SOLENOID VALVES, FILTER DRIERS, PIPE INSULATION, FLASHING AND SLEEVES THROUGH WALLS, PROPER SUPPORT OF REFRIGERANT PIPING, AND FULL REFRIGERANT CHARGE. PITCH REFRIGERATION PIPING IN DIRECTION OF OIL RETURN TO COMPRESSOR. PROVIDE TRAPS IN SUCTION LINE RISERS WHERE INDICATED OR REQUIRED. TRAPS SHALL BE FABRICATED FROM SHORT RADIUM STREET ELLS, ALL OTHER ELLS SHALL BE LONG RADIUS TYPE. SOLENOID VALVES SHALL BE INSTALLED WITH STEMS POINTING UP. AFTER THE REFRIGERANT PIPING HAS BEEN COMPLETED, THE SYSTEM SHALL BE PRESSURE TESTED AT PRESSURES SPECIFIED BY THE EQUIPMENT MANUFACTURER. THIS PRESSURE SHALL BE MAINTAINED ON THE SYSTEM FOR 10 CONSECUTIVE HOURS WITH NO APPRECIABLE PRESSURE CHANGE. WHILE THE PRESSURE IS APPLIED, THE SYSTEM SHALL BE CHECKED FOR LEAKS. THE SYSTEM SHALL THEN BE EVACUATED TO A MINIMUM VACUUM EQUIVILANT OF 500 MICRONS AND MAINTAINED FOR 12 HOURS. RELEASE VACUUM WITH NITROGEN AND EVACUATE AGAIN. AFTER EVACUATION, THE SYSTEM SHALL BE CHARGED WITH REFRIGERANT IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE EQUIPMENT MANUFACTURER.

ALL UNDERGROUND REFRIGERANT PIPING TO BE SLEEVED IN PVC PIPING, INSTALL EACH SET OF RS/R/L IN 6" PVC CONDUIT, SEAL ENDS WATERTIGHT.

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

SHOP DRAWING AND SUBMITTAL SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW PRIOR TO COMMENCING CONSTRUCTION. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR EACH ELEMENT OF CONSTRUCTION AND TYPE OF PRODUCT OR EQUIPMENT. CONTRACTOR SHALL SUBMIT FIVE COPIES OF EACH SHOP DRAWING, PRODUCT DATA AND SAMPLE.

SUBMITTALS SHALL INCLUDE INFORMATION REGARDING PRODUCTS, OPTIONS, MANUFACTURER'S RECOMMENDATIONS, PRODUCT SPECIFICATIONS, CATALOG CUTS, PERFORMANCE DATA, COMPLIANCE WITH SPECIFIED STANDARDS, DIMENSIONS, WIRING DIAGRAMS, AND INSTALLED LOCATIONS.

SHOW SIZES AND LOCATIONS, BY DIMENSIONS, OF DUCTS, EQUIPMENT, AND OTHER ITEMS. IDENTIFY MATERIALS AND EQUIPMENT BY DESCRIPTION AND NUMBER. INCLUDE WIRING DIAGRAMS, HOLE LOCATIONS AND SIZES, AND OTHER DATA THAT COULD AFFECT WORK BY OTHER TRADES. SHOW MANUFACTURERS' NAMES, TRADE NAMES, CATALOG NUMBERS, ACCESSORIES, SPECIAL FEATURES, AND RATING DATA. INDICATE REQUIRED CLEARANCES FOR OPERATING PARTS, FOR REMOVAL AND REINSTALLING, AND FOR SERVICING. SHOW PERFORMANCE DATA, INCLUDING FAN CURVES AND SOUND POWER LEVELS.

ALL SHOP DRAWINGS AND SUBMITTALS WHICH ARE TO BE PREPARED BY THE VARIOUS SUBCONTRACTORS AND EQUIPMENT SUPPLIERS SHALL FIRST BE SENT TO THE CONTRACTOR FOR CHECKING AND EVENTUAL FORMAL SUBMISSION TO THE ENGINEER. THE CONTRACTOR SHOULD CHECK ALL OF THESE DRAWINGS AND SUBMITTALS WITH RESPECT TO MEASUREMENTS, MATERIALS, IDENTIFICATIONS AND DETAILS SO AS TO MAKE CERTAIN THAT THEY CONFORM TO THE INTENT OF THE CONTRACT DOCUMENTS. DRAWINGS AND SUBMITTALS WHICH ARE FOUND TO BE INACCURATE OR OTHERWISE IN ERROR SHALL BE RETURNED BY THE CONTRACTOR TO THE ORIGINATING PARTY FOR CORRECTION BEFORE SUBMISSION TO THE ARCHITECT FOR APPROVAL.

SHEET METAL SHOP DRAWINGS SHALL BE SUBMITTED @ 3/8" = 1" SCALE. SHOP DRAWINGS SHALL INDICATE BOTTOM OF DUCT ELEVATIONS, STEEL LOCATIONS, REFLECTED CEILING PLAN, AND OTHER TRADE WORK SUCH AS LIGHTS, ETC.

PROJECT CLOSEOUT DOCUMENTS

DURING CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN A RECORD SET OF INSTALLATION PRINTS. HE SHALL RECORD ON THESE PRINTS, ALL DEVIATIONS FROM THE CONTRACT DRAWINGS IN DUCT SIZING, ROUTING, LOCATION AND DETAILS.

AT COMPLETION OF THE WORK, THE CONTRACTOR SHALL FORWARD THESE PRINTS TO THE ARCHITECT FOR INCORPORATION INTO THE FINAL AS-BUILT DRAWINGS.

OPERATIONS AND MAINTENANCE DATA
INCLUDE INTERCONNECTION WIRING DIAGRAMS. COMPLETE FIELD INSTALLED SYSTEM WITH IDENTIFIED AND NUMBERED SYSTEM COMPONENTS AND DEVICES.
INCLUDE INSPECTION PERIOD, CLEANING METHODS, CLEANING MATERIALS RECOMMENDED, AND CALIBRATION TOLERANCES. PROVIDE OPERATIONS AND MAINTENANCE MANUAL.

WARRANTY
PROVIDE MANUFACTURER'S STANDARD WARRANTY FOR ALL MATERIALS AND EQUIPMENT INSTALLED UNDER THIS SECTION.

DEMONSTRATION
DEMONSTRATE COMPLETE AND OPERATING SYSTEM TO OWNER OR THEIR REPRESENTATIVE. INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION OF SYSTEMS.

OWNER TRAINING

PROVIDE A MINIMUM OF A FOUR (4) HOUR TRAINING SESSION WITH OWNER'S PERSONNEL AT THE COMPLETION OF THE TESTING, BALANCING, AND ADJUSTING. NOTIFY THE ENGINEER IN WRITING AT LEAST FIVE (5) WORKING DAYS BEFORE SCHEDULING THE TRAINING SESSION.

FINAL ADJUSTMENT OF EQUIPMENT

AFTER COMPLETION OF THE INSTALLATION, ADJUST THERMOSTATS, CONTROL VALVES, MOTORS AND SIMILAR EQUIPMENT PROVIDED AS WORK OF THIS SECTION. FINAL ADJUSTMENT SHALL BE PERFORMED BY SPECIFICALLY TRAINED PERSONNEL IN THE DIRECT EMPLOY OF THE MANUFACTURER OF THE PRIMARY TEMPERATURE CONTROL SYSTEM.



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WARRANTY
PROVIDE MANUFACTURER'S STANDARD WARRANTY FOR ALL MATERIALS AND EQUIPMENT INSTALLED UNDER THIS SECTION.

DEMONSTRATION
DEMONSTRATE COMPLETE AND OPERATING SYSTEM TO OWNER OR THEIR REPRESENTATIVE. INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION OF SYSTEMS.

OWNER TRAINING

PROVIDE A MINIMUM OF A FOUR (4) HOUR TRAINING SESSION WITH OWNER'S PERSONNEL AT THE COMPLETION OF THE TESTING, BALANCING, AND ADJUSTING. NOTIFY THE ENGINEER IN WRITING AT LEAST FIVE (5) WORKING DAYS BEFORE SCHEDULING THE TRAINING SESSION.

FINAL ADJUSTMENT OF EQUIPMENT

AFTER COMPLETION OF THE INSTALLATION, ADJUST THERMOSTATS, CONTROL VALVES, MOTORS AND SIMILAR EQUIPMENT PROVIDED AS WORK OF THIS SECTION. FINAL ADJUSTMENT SHALL BE PERFORMED BY SPECIFICALLY TRAINED PERSONNEL IN THE DIRECT EMPLOY OF THE MANUFACTURER OF THE PRIMARY TEMPERATURE CONTROL SYSTEM.

DRAWING NAME: MECHANICAL SPECIFICATIONS

WOODLANDS AT GREYSTONE
SCULLTHORPE DR., WEST GOSHEN TOWNSHIP
CHESTER COUNTY, PA

LOCATION:

Project number: 18-053	Drawn by: Author
date: 2019-11-27	chk'd by: Checker
scale: 1/2" = 1'-0"	approved by: Approver
sheet no.	

M6.0

LIGHTING FIXTURE SCHEDULE

Table with columns: Type Mark, Manufacturer & Catalog Number, Mounting Type, Descriptions, Lamp. Includes items A through OB with various lighting fixture details.

GENERAL LIGHTING FIXTURE SCHEDULE NOTES: 1. PROVIDE CORRECT TRIM FOR ALL FIXTURES INSTALLED IN A HARD CEILING OR SPECIALTY CEILING TYPE. 2. PROVIDE ALL APPROPRIATE MOUNTING HARDWARE...

GENERAL NOTES:

- 1. CONTRACTOR SHALL PROVIDE BRANCH CIRCUIT WIRING TO ALL ITEMS WHICH REQUIRE ELECTRICAL CONNECTIONS. 2. CONTRACTOR SHALL USE ONLY THOSE WIRING METHODS ALLOWED IN THE SPECIFICATIONS. 3. A MAXIMUM OF 3 CIRCUITS SHALL BE RUN IN ONE CONDUIT...

CONTROL EQUIPMENT table listing symbols for Manual Motor Starter, Combination Motor Starter, Motor, Disconnect Switch, and Transformer.

STANDARD MOUNTING HEIGHTS table listing mounting heights from 9" below finished ceiling to 0" (finished floor) with corresponding descriptions.

- MOUNTING HEIGHT NOTES: 1. MOUNTING HEIGHTS TO CENTER OF OUTLETS UNLESS OTHERWISE NOTED. 2. THE ABOVE MOUNTING HEIGHTS SHALL BE ADHERED TO UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE ON THE DRAWING OR SPECIFICATIONS.

THE ELECTRICAL SYSTEMS PRESENTED ON THE SUBSEQUENT DRAWINGS WERE DESIGNED IN ACCORDANCE WITH THE FOLLOWING APPLICABLE CODES AND STANDARDS: THE NATIONAL ELECTRICAL CODE (NEC), 2014...

SITE WORK table listing symbols for Utility Pole, Pole Mounted Area Lighting Fixture, Manhole, and Ground Rod.

SIGNAL SYSTEM table listing symbols for Smoke Detector, Carbon Monoxide Detector, Heat Detector, Manual Pull Station, Audio Alarm, Visual Alarm, and Audio/Visual Alarm.

Table listing symbols for Flow Switch, Tamper Switch, Pressure Switch, Time Clock, Keypad, Pushbutton, Floor Box Mounted Data/Telephone Outlet, Volume Control, Card Reader, and Data/Telephone Outlet.

Table listing symbols for Ceiling/Dome Camera, Wall/Dome Camera, Bullet Camera, Door Contact, Ceiling Mounted Speaker, PA Horn Speaker, PA Horn Speaker Outdoor Weather Proof, Wireless Clock, and Abbreviations & Symbols.

Table listing symbols for Panelboards (Surface Mounted, Flush Mounted, Existing Surface Mounted, Existing Flush Mounted) and Circuits (Junction Box, Branch Circuit Number).

LIGHTING table listing symbols for 2x2, 2x4, 1x8, 2x8, 1x4, 6"x4", 6"x2", Wall Pack, Strip Light, Wall Washer, Round Recessed Downlight, Normal Emergency, Emergency Battery Unit, Remote Head, Exit Sign-Double Face, Exit Sign-Ceiling Mounted, Exit Sign-Single Face, and Wall Sconce.

WIRING DEVICES table listing symbols for Single Pole Switch, 3-Way Switch, 4-Way Switch, Key Switch, Spring Wound Time Switch, Spring Wound Time Switch, Dimmer Switch, Manual Motor Starter, 3-Way Dimmer Switch, Occupancy Sensor Switch, Pilot Light Switch, Manual Override, Switch with Occupancy Sensor, Dual Technology Occupancy Sensor, Dual Technology Occupancy Sensor - Corridor Pattern, Dual Technology Occupancy Sensor - Corner Mount, Ceiling Mounted Daylight Sensor, Multiple Button Digital Control Station, Duplex Receptacle, Counter Top Duplex Receptacle, Tamperproof Duplex Receptacle, Duplex Receptacle with USB Port, Single Receptacle, GFI Duplex Receptacle, Duplex Receptacle with Top Switched, Quad Receptacle, Single Phase Special Receptacle, Three Phase Special Receptacle, Floor Box Mounted Duplex Receptacle, Combination Power/Communications Floor Box-Devices, Cord Reel, and Television Cable Outlet.

Table listing symbols for Demolition Drawing Linetype Designations (Existing to Remain, Existing to Be Removed).

NOTE: NOT ALL ABBREVIATIONS AND SYMBOLS INDICATED MAY APPEAR ON THESE CONTRACT DRAWINGS. THIS IS FOR REFERENCE ONLY.

A

B

C

D

E

F

G

ELECTRICAL DRAWING LIST

Table listing drawing list items: E0.0 ELECTRICAL INFORMATION SHEET, E1.0 FIRST FLOOR PLAN - LIGHTING, E1.1 SECOND FLOOR PLAN - LIGHTING, E2.0 FIRST FLOOR PLAN - POWER, E2.1 SECOND FLOOR PLAN - POWER, E3.0 ELECTRICAL DETAILS, E4.0 ELECTRICAL SPECIFICATIONS, E4.1 ELECTRICAL SPECIFICATION AND SCHEDULES.



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REVISIONS table with columns: Description, Date, No.

SEAL:

ELECTRICAL INFORMATION SHEET WOODLANDS AT GREYSTONE SCULTHORPE DR. WEST GOSHEN TOWNSHIP CHESTER COUNTY, PA

Table with columns: Project number, date, scale, sheet no., Drawn by, Author, chkd by, Checker, approv. by, Approver.

E0.0

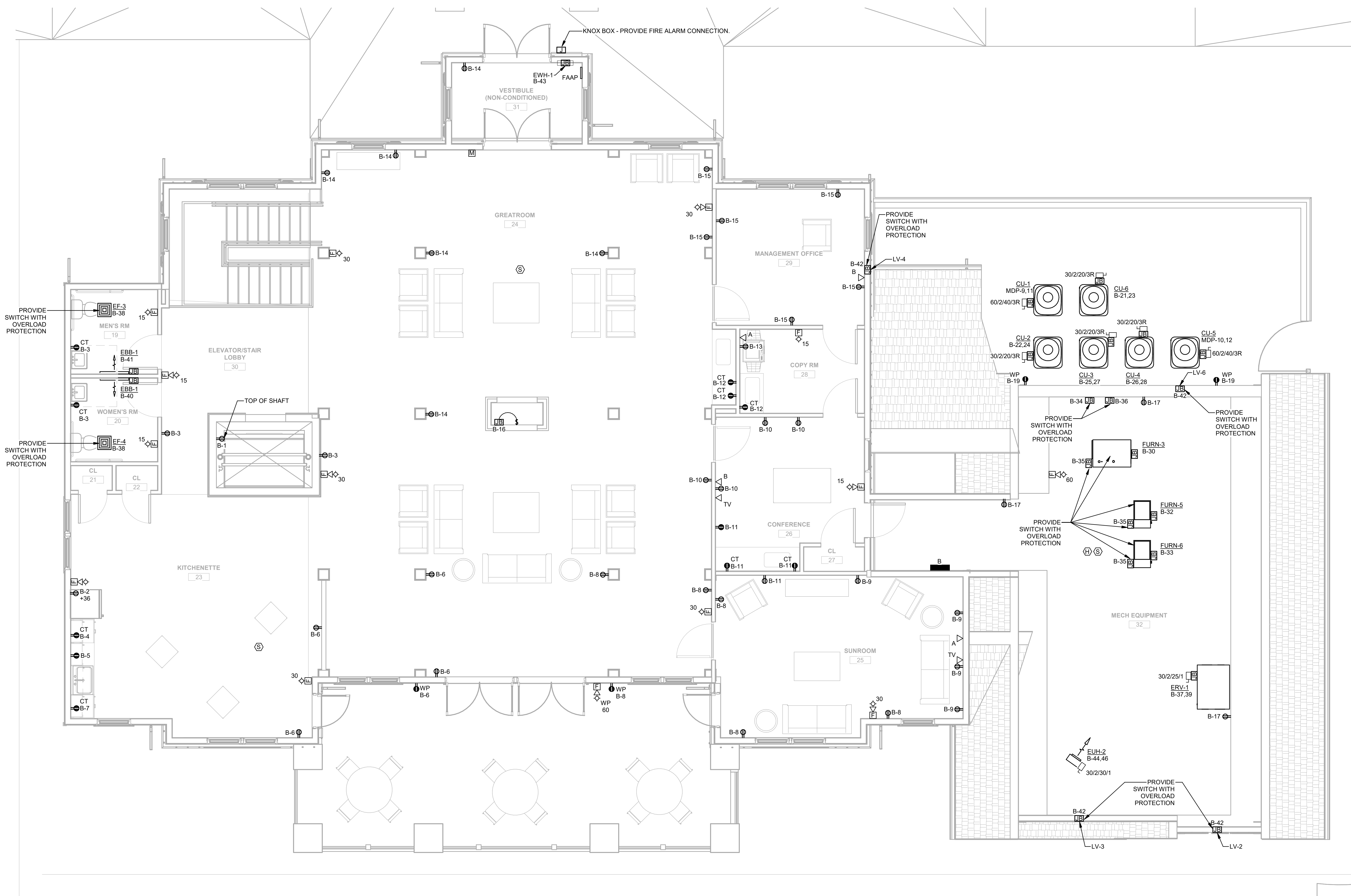
GENERAL NOTES:

1. ...

NOTES BY SYMBOL: ①

(THIS DRAWING ONLY)

① --



① SECOND FLOOR PLAN - POWER
SCALE: 1/4" = 1'-0"



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REVISIONS	Description	Date	No.

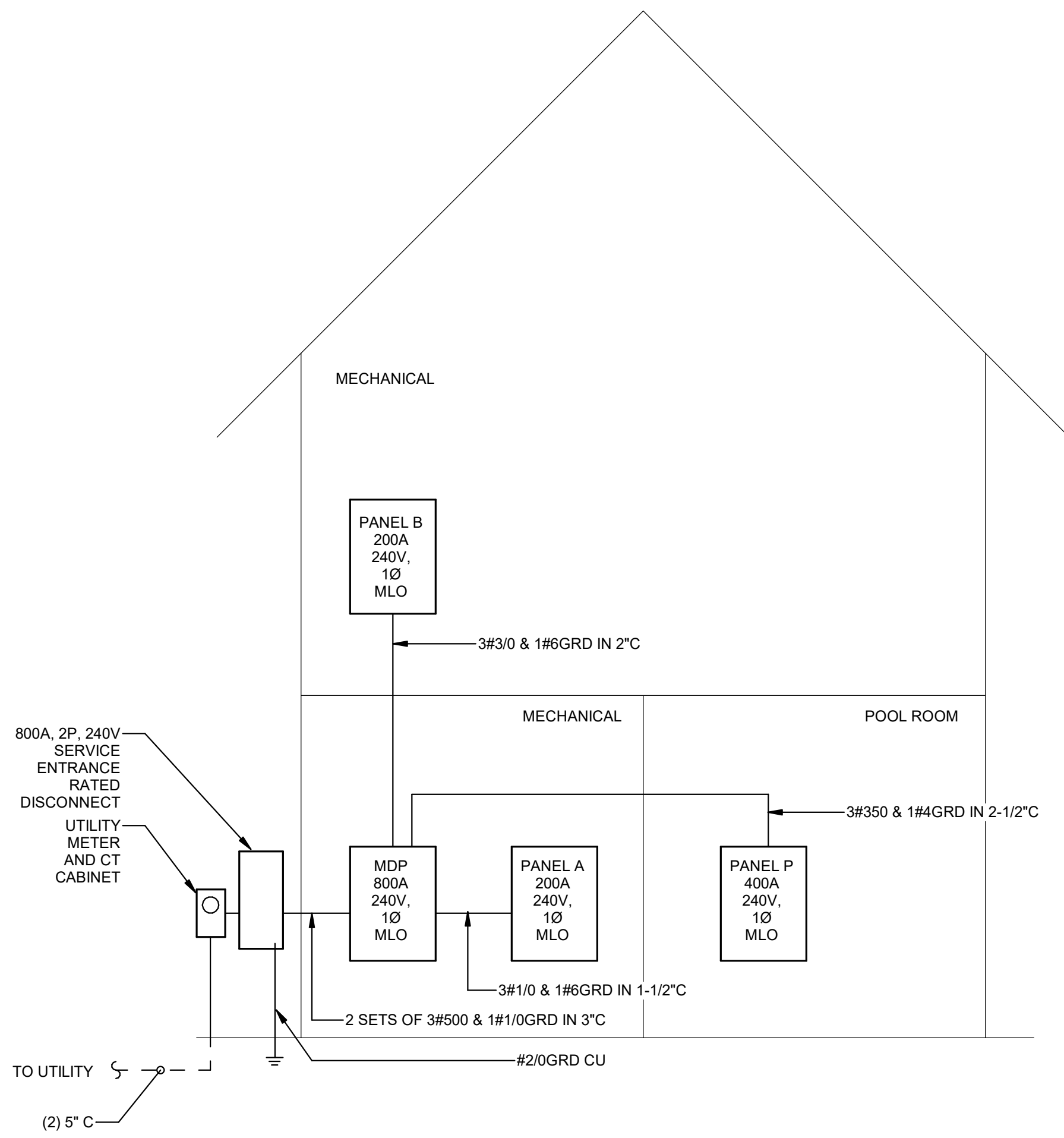
SEAL:

WOODLANDS AT GREYSTONE
SCULTHORPE DR. WEST GOSHEN TOWNSHIP
CHESTER COUNTY, PA

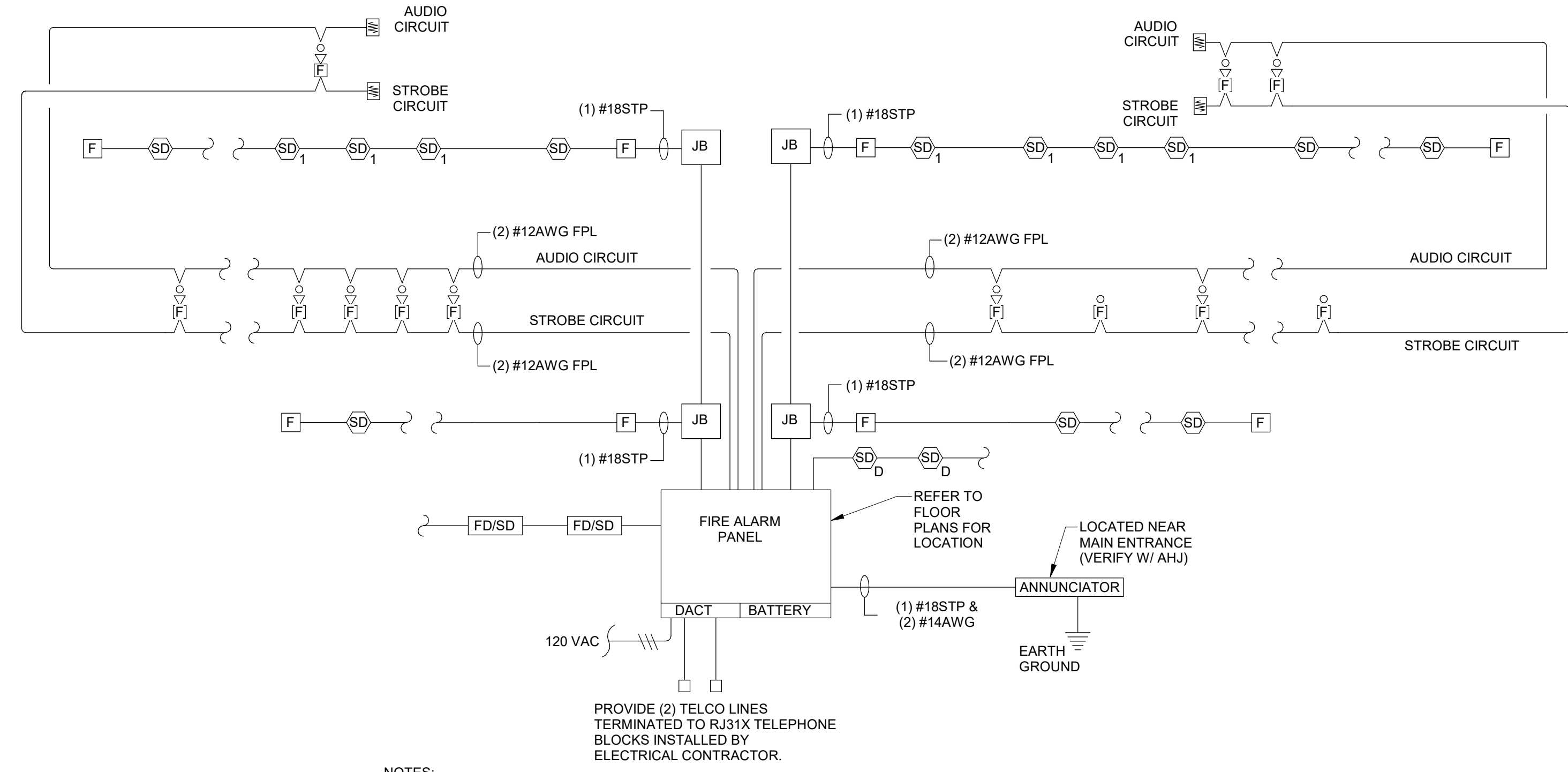
DRAWING NAME: SECOND FLOOR PLAN - POWER

Project number: 18-053	Drawn by: Author
date: 2019-11-27	chk'd by: Checker
scale: 1/4" = 1'-0"	approv. by: Approver
sheet no.	

E2.1

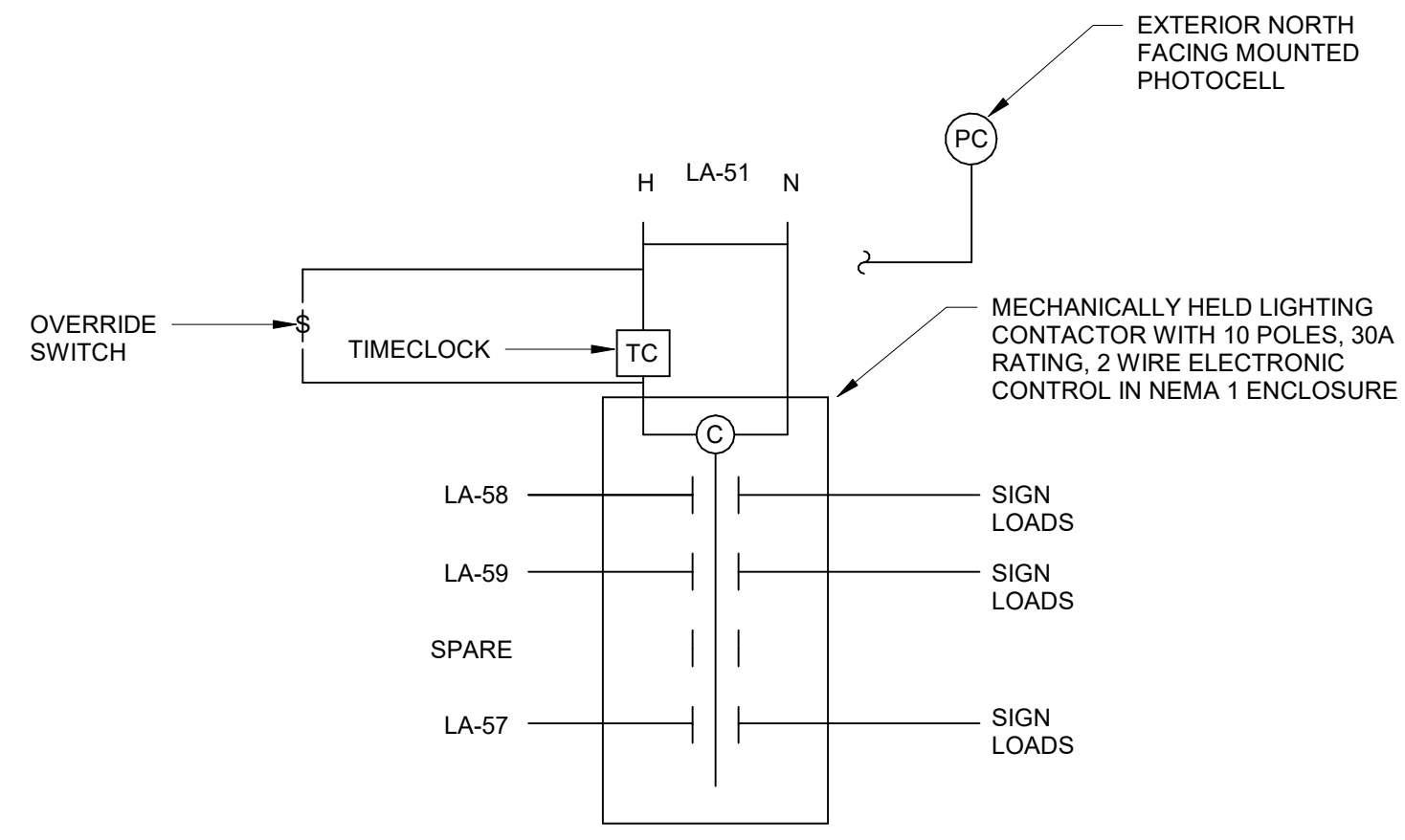


① RISER DIAGRAM
SCALE: NO SCALE

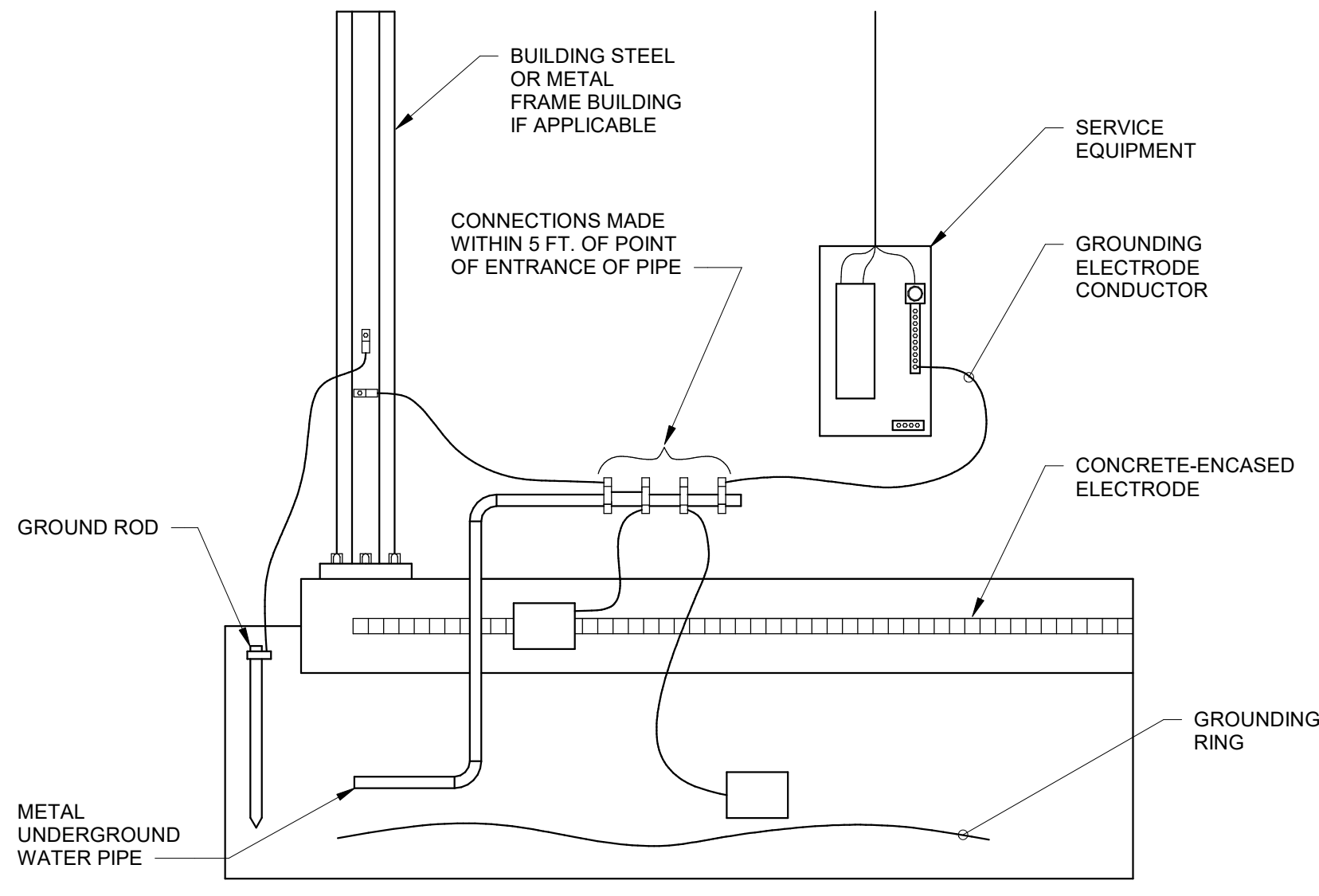


- NOTES:**
1. FURNISH ALL DUCT DETECTORS AND ASSOCIATED WIRING. MECHANICAL CONTRACTOR TO INSTALL DETECTORS. CONTRACTOR SHALL REFER TO MECHANICAL PLANS FOR DUCT DETECTOR LOCATIONS AND QUANTITIES.
 2. DIAGRAMMATIC ONLY - NUMBER OF DEVICES DOES NOT MATCH THOSE SHOWN ON THE DRAWING.
 3. PROVIDE CONNECT TO ALL ZONE VALVES, FLOW AND TAMPER SWITCHES. SEE FIRE PROTECTION DRAWINGS FOR QUANTITIES AND LOCATIONS.
 4. PROVIDE CONNECTION TO SMOKE AND FIRE/SMOKE DAMPERS. SEE MECHANICAL PLANS FOR LOCATIONS AND QUANTITIES.
 5. FOR ALL COMPONENTS INCLUDING THE MAIN FIRE ALARM PANEL AND EXTENDER PANELS THAT REQUIRE POWER, PROVIDE 120V, 20A DEDICATED CIRCUIT FROM NEAREST PANEL WITH SPACE. EXTEND 2#12 & 1#12GRD IN 3/4\"/>
 - 6. PROVIDE SMOKE DETECTOR AND HEAT DETECTOR ABOVE MAIN FIRE ALARM PANEL.

② TYPICAL FIRE PROTECTION SIGNALING SYSTEM RISER DIAGRAM
SCALE: 12" = 1'-0"



③ EXTERIOR LIGHTING CONTACTOR WIRING DIAGRAM
SCALE: 12" = 1'-0"



④ GROUNDING ELECTRODE DETAIL
SCALE: 12" = 1'-0"

REVISIONS	Description	Date	No.	chk'd by

SEAL:

WOODLANDS AT GREYSTONE
SCULTHORPE DR. WEST GOSHEN TOWNSHIP
CHESTER COUNTY, PA

Project number: 18-053	Drawn by: Author
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sheet no.	

E3.0

ELECTRICAL SPECIFICATIONS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. IT IS THE INTENT OF THESE SPECIFICATIONS AND ACCOMPANYING DRAWINGS TO GENERALLY DESCRIBE THE WORK NECESSARY FOR THE INSTALLATION OF A COMPLETE ELECTRICAL, LIGHTING, AND POWER SYSTEM (INCLUDING FIRE ALARM).
- B. THESE DRAWINGS AND SPECIFICATIONS ARE NOT INTENDED TO SHOW THE LOCATION OF EVERY WIRE, CONDUIT, FITTING, ETC., BUT IS UNDERSTOOD THAT THE CONTRACTOR SHALL FURNISH AND INSTALL ALL MATERIALS AND LABOR FOR COMPLETE WORKABLE SYSTEMS UNLESS NOTED OTHERWISE IN THIS SPECIFICATION OR ON THE DRAWINGS.
- C. CONTRACTOR SHALL PROVIDE BUT NOT BE LIMITED TO:
 1. COMPLETE SYSTEM OF WIRING FOR EMERGENCY LIGHTING, LIGHT AND POWER, PLUMBING, HVAC EQUIPMENT, FIRE ALARM ALONG WITH TELEPHONE AND DATA EQUIPMENT INSTALLATION.
 2. ALL PANELS, SWITCHBOARDS, MOTOR CONTROLLERS, TRANSFORMERS, DISCONNECTS, RECEPTACLES, SWITCHES, OUTLETS AND PLATES FOR SAME, FEEDERS FROM PANELS AND RELATED APPURTENANCES.
 3. LIGHTING FIXTURES, LAMPS, BALLASTS AND APPURTENANCES.

- D. DESIGN DRAWINGS ARE DIAGRAMMATIC AND DO NOT SHOW ALL OFFSETS, BENDS, ELBOWS, FITTINGS OR OTHER SPECIFIC ELEMENTS WHICH MAY BE REQUIRED FOR COMPLETE INSTALLATION OF THE WORK. SUCH WORK MAY BE ACCOMPLISHED AT THE SITE. ADDITIONAL BENDS, OFFSETS AND CONDUIT AS REQUIRED BY VERTICAL AND HORIZONTAL EQUIPMENT LOCATIONS OR OTHER JOB CONDITIONS SHALL BE PROVIDED TO COMPLETE THE WORK AT NO ADDITIONAL COST TO THE OWNER.

- E. EXCEPT WHERE SHOWN IN DIMENSIONAL DETAIL, THE LOCATIONS OF SWITCHES, RECEPTACLES, LIGHTS AND OTHER EQUIPMENT SHOWN ON PLANS ARE APPROXIMATE. SUCH ITEMS SHALL BE PLACED SO AS TO ELIMINATE INTERFERENCE WITH DUCTS, PIPING AND EQUIPMENT. THE EXACT LOCATION SHALL BE DETERMINED IN THE FIELD. ALL DOOR SWINGS SHALL BE VERIFIED SO THAT LIGHT SWITCHES ARE PROPERLY LOCATED.

- F. FIELD VERIFY EXISTING CONDITIONS AND COORDINATE ALL WORK WITH ALL OTHER TRADES, AND ACTUAL CONDITIONS IN FIELD.

- G. ALL DEBRIS MATERIAL RESULTING FROM NEW WORK SHALL, UNLESS OTHERWISE INDICATED, BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE PREMISES BY HIM.

- A. PROVIDE (FURNISH AND INSTALL) ALL WORK SPECIFIED OR INDICATED, IN CONFORMANCE WITH THE MANUFACTURERS PUBLISHED INSTALLATION INSTRUCTIONS, COMPLETE WITH ALL APPURTENANCES, ARRANGED TO MEET JOB CONDITIONS, FOR COMPLETE OPERATING SYSTEMS IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC) AND ALL OTHER LOCAL CODES/REGULATIONS. ALL EQUIPMENT AND MATERIALS INSTALLED SHALL BEAR THE LABEL OF THE UNDERWRITERS LABORATORIES, INC., WHERE SO REQUIRED BY THE NFPA REGULATIONS.

1.3 QUALITY ASSURANCE

- A. APPROVAL OF MATERIALS AND EQUIPMENT WILL BE BASED ON THE MANUFACTURERS PUBLISHED DATA. PROOF THAT THE ITEMS FURNISHED CONFORM TO THE SPECIFIED REQUIREMENTS AS INDICATED BELOW SHALL BE SUBMITTED FOR APPROVAL.

- B. WHERE MATERIAL AND EQUIPMENT ARE SPECIFIED TO CONFORM TO THE STANDARDS OF THE UNDERWRITERS LABORATORIES (UL), INC., THE UL LABEL OR LISTING WILL BE ACCEPTABLE AS SUFFICIENT EVIDENCE THAT THE ITEMS CONFORM TO REQUIREMENTS.

- C. EQUIPMENT DESIGN, FABRICATION, TESTING, PERFORMANCE AND INSTALLATION SHALL, UNLESS SHOWN OTHERWISE, COMPLY WITH AND MEET ALL THE APPLICABLE REQUIREMENTS OF NFPA 70 (THE NEC), ANSI C2, REFERENCED INDUSTRIAL CODES AND STANDARDS AND LOCAL CODES HAVING JURISDICTION.

1.4 MATERIALS AND SUBMITTALS

- A. ALL MATERIALS SHALL BE NEW. THE CONTRACTOR MAY SELECT DEVICES AS INDICATED ON THESE DRAWINGS. SUBSTITUTES MAY BE SUBMITTED AND USED WITH WRITTEN APPROVAL OF OWNER/ARCHITECT/ENGINEER. SUBMIT SHOP DRAWINGS TO OWNER/ARCHITECT/ENGINEER FOR APPROVAL.
- B. SHOP DRAWINGS SHALL INCLUDE BUT ARE NOT LIMITED TO:
 1. LIGHTING FIXTURES
 2. RECEPTACLES, BOXES, ENCLOSURES
 3. SERVICE EQUIPMENT
 4. PANELBOARDS
 5. CONDUIT, WIRING, FITTINGS
 6. DISCONNECT SWITCHES
 7. SWITCHES, COVER PLATES
 8. TIME CLOCKS, PHOTOCELLS AND LIGHTING CONTACTOR

- C. SUBMITTALS SHALL BE MADE FOR THE EQUIPMENT LISTED ABOVE. THE ARCHITECT SHALL MAKE THE ULTIMATE DECISION ON COLOR AND FINISH FOR ALL DEVICES SUCH AS RECEPTACLES, SWITCHES, SWITCH PLATES, AS WELL AS ANY OTHER CONTROL DEVICES. THIS APPROVAL SHALL BE MADE BEFORE ANY ITEMS ARE ORDERED.

- D. PRODUCT REQUIREMENTS: MATERIALS AND EQUIPMENT TO BE PROVIDED SHALL BE THE STANDARD CATALOGED PRODUCTS OF MANUFACTURERS REGULARLY ENGAGED IN THE MANUFACTURE OF THE PRODUCTS. MATERIALS AND EQUIPMENT SHALL MEET THE SPECIFIED AND DETAILED REQUIREMENTS INDICATED. BE SUITABLE FOR THE INSTALLATION SHOWN AND SHALL REPRESENT PRODUCTS THAT HAVE BEEN IN SATISFACTORY USE AT LEAST TWO YEARS. PRODUCTS NOT MEETING ALL SPECIFIED REQUIREMENTS WILL NOT BE ACCEPTED.

- E. OWNER INSTRUCTION AND OPERATION MANUALS SHALL BE PROVIDED TO INSTRUCT IN THE PROPER OPERATION AND MAINTENANCE OF ALL WORK. PROVIDE A MINIMUM OF (3) THREE OPERATING MANUALS FOR ALL WORK.

- F. APPROVALS, CODES, ORDINANCES AND REGULATIONS.
 - A. ALL WORK AND MATERIALS SHALL CONFORM TO ALL CODES, ORDINANCES, REGULATIONS, STANDARDS AND RULES. ALL PERMITS, UTILITY FEES AND COSTS, INSPECTION CERTIFICATES AND APPROVALS SHALL BE SECURED AND PAID BY THE CONTRACTOR.
 - B. WORK SHALL NOT BE COVERED UP NOR ENCLOSED UNTIL IT HAS BEEN INSPECTED, TESTED AND APPROVED. ANY WORK THAT IS ENCLOSED OR COVERED UP BEFORE SUCH INSPECTION AND TEST, SHALL BE UNCOVERED AFTER IT HAS BEEN INSPECTED AND APPROVED. ALL UNCOVERED ITEMS SHALL BE RESTORED TO ITS ORIGINAL COVERED CONDITION AT NO ADDITIONAL COST TO THE OWNER.
 - C. SECURE ELECTRICAL INSPECTION CERTIFICATE FROM AUTHORIZED AGENT.

- G. CONTINUITY OF WORK AND COORDINATION
 - A. PLAN CONSTRUCTION SCHEDULE TO COORDINATE WITH ALL OTHER TRADES, UNLESS A SCHEDULED CHANGE HAS BEEN ARRANGED WITH THE OWNER/ARCHITECT/ENGINEER.
 - B. COORDINATION SHALL INCLUDE ADEQUATE CLEARANCES FOR THE INSTALLATION AND MAINTENANCE OF EQUIPMENT AND PHYSICAL AND ELECTRICAL REQUIREMENTS OF ITEMS OR EQUIPMENT REQUIRING CONNECTIONS.

1.7 STORAGE AND PRESERVATION OF MATERIALS

- A. EQUIPMENT AND MATERIALS STORED AT THE SITE, PRIOR TO FINAL INSTALLATION, SHALL BE FULLY PROTECTED FROM DAMAGE, DIRT, DEBRIS, AND WEATHER. DENTS, MARKED FINISHES AND OTHERWISE DAMAGED EQUIPMENT SHALL BE REPAIRED TO ITS ORIGINAL CONDITION OR REPLACED.

1.8 SUPPORTING DEVICES AND HANGERS

- A. SECURE ALL EQUIPMENT, DEVICES AND RACEWAYS.
- B. ELECTRICAL COMPONENTS AND SYSTEMS AND THEIR ATTACHMENTS SHALL BE DESIGNED TO RESTRAIN SEISMIC FORCES AS REQUIRED BY ALL AUTHORITIES AND LOCAL ORDINANCES HAVING JURISDICTION.
- C. ALL CONDUITS SHALL BE SECURELY FASTENED WITHIN 3 FEET OF EACH OUTLET BOX, JUNCTION BOX, CABINET, FITTING OR END OF CONDUIT, OR AS SHOWN ON THE DRAWINGS.
- D. SUPPORTS SHALL BE HOT-DIPPED GALVANIZED STEEL OR AS INDICATED ON THE DRAWINGS.
- E. DO NOT FASTEN SUPPORTS TO PIPES, DUCTS, MECHANICAL EQUIPMENT OR CONDUIT.

1.9 IDENTIFICATION

- A. ALL ELECTRICAL EQUIPMENT SHALL BE IDENTIFIED AS HEREIN SPECIFIED AND INDICATED ON THE DRAWINGS. EQUIPMENT TO BE IDENTIFIED SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:
 1. ELECTRICAL POWER AND BRANCH CIRCUIT CONDUCTORS
 2. FEEDER CONDUITS
 3. OUTLET BOXES (COVER PLATES)
 4. PANELBOARDS
 5. DISCONNECTS
 6. FIRE ALARM CONTROL PANELS

- B. NAMEPLATES SHALL GENERALLY BE BLACK TYPED LETTERS WITH WHITE BACKGROUND OR WHITE TYPED LETTERS WITH BLACK BACKGROUND ON LAMINATED PLASTIC WITH BEVELED EDGES. LETTERS SHALL BE A MINIMUM OF 1/8" HIGH. CONDUIT MARKERS SHALL BE STANDARD PRE-PRINTED FLEXIBLE PLASTIC SHEET MATERIAL OR SELF-ADHERING VINYL LABELS. WIRE MARKERS SHALL BE LAMINATED PLASTIC NAMEPLATES, SELF-ADHERING VINYL LABELS OR TAPE. 3

- C. PROVIDE A TYPED DIRECTORY FOR EACH PANELBOARD INDICATING THE ITEM/ITEMS CONTROLLED BY EACH CIRCUIT. THE DIRECTORY SHALL BE LOCATED ON THE INSIDE OF THE HINGED DOOR TO THE PANEL.

- D. NAMEPLATES SHALL GENERALLY BE BLACK TYPED LETTERS WITH WHITE BACKGROUND OR WHITE TYPED LETTERS WITH BLACK BACKGROUND ON LAMINATED PLASTIC WITH BEVELED EDGES. LETTERS SHALL BE A MINIMUM OF 1/8" HIGH. CONDUIT MARKERS SHALL BE STANDARD PRE-PRINTED FLEXIBLE PLASTIC SHEET MATERIAL OR SELF-ADHERING VINYL LABELS. WIRE MARKERS SHALL BE LAMINATED PLASTIC NAMEPLATES, SELF-ADHERING VINYL LABELS OR TAPE. 3

- E. PROVIDE A TYPED DIRECTORY FOR EACH PANELBOARD INDICATING THE ITEM/ITEMS CONTROLLED BY EACH CIRCUIT. THE DIRECTORY SHALL BE LOCATED ON THE INSIDE OF THE HINGED DOOR TO THE PANEL.

PART 2 - PRODUCTS

2.1 BUILDING WIRE AND CABLE

A. WIRE AND CONDUCTORS

1. INSULATED CURRENT-CARRYING WIRE AND GROUNDING CONDUCTORS SHALL BE COPPER AND SHALL CONFORM TO NFPA 70 AND ASTM B3 (SOFT OR ANNEALED COPPER WIRE).
2. CONDUCTORS NO. 10 AWG AND SMALLER SHALL BE SOLID ROUND COPPER WIRE. CONDUCTORS NO. 8 AWG AND LARGER SHALL BE STRANDED CONCENTRIC COPPER WIRE.
3. MULTICONDUCTOR CABLE: COMPLY WITH NFPA 70 FOR ARMORED CABLE (TYPE AC) AND METAL-CLAD CABLE (TYPE MC) WITH GROUND WIRE (ONLY ALLOWABLE FOR CIRCUITS 40A OR LESS) WHERE USED IN HEALTH CARE FACILITIES. IT SHALL BE RATED PER NEC REQUIREMENTS. HEALTH CARE FACILITY (HCF) CABLE SHALL BE OF ALUMINUM ARMOR, AND PROVIDED WITH ALL NECESSARY CONNECTORS. MEET UL STANDARD 4, NEC ARTICLE 517.
4. THE CONTRACTOR SHALL PROVIDE APPROPRIATELY SIZED FEEDERS, BRANCH, CONTROL AND MISCELLANEOUS CONDUCTORS APPROPRIATELY SIZED IN CONFORMANCE WITH THE NATIONAL ELECTRIC CODE.
5. ALL WIRING SHALL BE INSTALLED IN CONDUIT OR MULTICONDUCTOR CABLE WHERE ALLOWED.
6. BUILDING WIRE SHALL BE TYPE THW, THHN/THHW OR XHHW WITH A MINIMUM TEMPERATURE RATING OF 75 DEGREES C.
7. A GREEN GROUND WIRE SHALL BE RUN WITH ALL CIRCUITS.
8. CONTRACTOR SHALL ACCOUNT FOR VOLTAGE DROP WHEN PROVIDING LONG LEAD LENGTHS OF CONDUCTORS.

B. INSTALLATION

1. RACEWAYS AND WIRING SHALL BE INSTALLED AS INDICATED AND CIRCUITS SHALL NOT BE COMBINED WITHOUT PRIOR APPROVAL.
2. CONDUCTORS OF SPECIAL SERVICE SYSTEMS AND POWER SYSTEMS SHALL NOT OCCUPY THE SAME ENCLOSURE WITH LIGHT AND POWER CONDUCTORS OR THE SAME ENCLOSURE WITH EACH OTHER. CONDUCTORS SHALL BE CONTINUOUS WITH SPLICES AND CONNECTIONS MADE IN OUTLET, JUNCTION OR PULL BOXES ONLY.
3. ALL FEEDER AND BRANCH CIRCUIT CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS:

CONDUCTOR PHASE	240V/120V
A	BLACK
B	RED
NEUTRAL	WHITE
GROUND	GREEN
4. CONDUCTORS UP TO AND INCLUDING NO. 8 AWG SHALL BE MANUFACTURED WITH COLORED INSULATING MATERIALS. CONDUCTORS LARGER THAN NO. 8 AWG SHALL HAVE ENDS IDENTIFIED WITH COLORED PLASTIC TAPE IN ALL OUTLET, PULL OR JUNCTION BOXES. ALL CONTROL CIRCUIT CONDUCTORS SHALL BE IDENTIFIED AT EACH CONNECTION POINT.
5. CONNECTIONS AND SPLICES SHALL BE MADE IN APPROVED ENCLOSURES UTILIZING SOLDERLESS PRESSURE CONNECTORS AND ADEQUATE INSULATION WITH VINYL-PLASTIC ELECTRICAL INSULATING TAPE. CONDUCTOR IDENTIFICATION SHALL BE PROVIDED WITHIN EACH ENCLOSURE WHERE A TAP, SPLICE OR TERMINATION IS MADE AND AT THE EQUIPMENT TERMINAL OF EACH CONDUCTOR.
6. WHERE SEVERAL FEEDERS PASS THROUGH A COMMON PULLBOX, THE FEEDERS SHALL BE TAGGED TO CLEARLY INDICATE THE ELECTRICAL CHARACTERISTICS, CIRCUIT NUMBER AND PANEL DESIGNATION.
7. MAXIMUM CABLE PULLING TENSION SHALL NOT EXCEED VALUES RECOMMENDED BY CABLE MANUFACTURER.
8. CIRCUIT CONDUCTORS SHALL BE SAME AWG SIZE FROM SOURCE TO LOAD. NEUTRAL WIRES SHALL BE THE SAME SIZE AS PHASE WIRES EXCEPT AS NOTED ON DRAWINGS.
9. ALL 600V RATED WIRE CONNECTIONS, NO. 8 AWG AND LARGER, STUD-TYPE OR FLAT-BAR TYPE EQUIPMENT TERMINALS SHALL BE TERMINATED WITH A COMPRESSION TYPE LUG.
10. MULTICONDUCTOR CABLE MAY ONLY BE USED WHERE CONCEALED IN WALLS OR ABOVE ACCESSIBLE CEILING IN ACCORDANCE WITH THE NEC. MULTICONDUCTOR CABLE SHALL BE SUPPORTED INDEPENDENT OF CEILING STRUCTURE.
11. MULTICONDUCTOR CABLE IN PLENUM SPACES SHALL BE COMPLIANT WITH NEC 300.22 - MC CABLE EMPLOYING A SMOOTH OR CORRUGATED METAL SHEATH WITHOUT AN OVERALL NONMETALLIC COVERING.

2.2 GROUNDING

- A. PROVIDE ALL ELECTRICAL SYSTEM GROUNDS AS REQUIRED BY THE NATIONAL ELECTRICAL CODE, AND THE NATIONAL ELECTRICAL SAFETY CODE.
- B. THE FOLLOWING SHALL BE SOLIDLY GROUNDED:
 1. CONDUIT SYSTEM (NEC ARTICLE 250)
 2. ALL EQUIPMENT WITH ANY ELECTRICAL CONNECTIONS
 3. NEUTRAL LEAD OF LOW TENSION SECONDARY SERVICE

- C. A SEPARATE GROUNDING CONDUCTOR OR SHALL BE FURNISHED AND INSTALLED FOR ALL ELECTRICAL EQUIPMENT ENCLOSURES AND CONDUIT ENCLOSURES SHALL BE GROUNDED.

- D. ALL FEEDER DISCONNECTS AND BREAKERS RATED 1000 AMPERES AND ABOVE IN A SOLIDLY GROUNDED WYE SYSTEM WITH GREATER THAN 150 VOLTS TO GROUND, BUT NOT EXCEEDING 600 VOLTS PHASE TO PHASE SHALL BE PROVIDED WITH GROUND FAULT PROTECTION.

2.3 RACEWAYS AND BOXES

- A. RACEWAY
 1. ELECTRICAL METALLIC TUBING (EMT) SHALL BE METALLIC CONDUIT OF THE THIN WALL TYPE IN STRAIGHT LENGTHS, ELBOWS, OR BENDS AND SHALL CONFORM TO ANSI C80.3 AND THE REQUIREMENTS OF UL 797.
 2. COUPLINGS AND CONNECTORS FOR EMT SHALL BE HEX-NUT EXPANSION-GLAND, COMPRESSION TYPE, ZINC OR CADMIUM PLATED, CRIMP, SPRING OR SET-SCREW TYPE FITTINGS ARE NOT ACCEPTABLE. WHERE EMT ENTERS OUTLET BOXES, CABINETS OR OTHER ENCLOSURES, CONNECTORS SHALL BE THE INSULATED-THROAT TYPE, WITH LOCKNUTS. FITTINGS SHALL MEET THE REQUIREMENTS OF ANSINEMA FBI.
 3. FLEXIBLE METALLIC CONDUIT (FMC) SHALL MEET THE REQUIREMENTS OF UL 1.
 4. RIGID GALVANIZED STEEL CONDUIT (RMC) SHALL CONFORM TO UL 6 AND ANSI C80.1. CONDUIT FITTINGS SHALL CONFORM TO ANSINEMA FBI.
 5. INTERMEDIATE METAL CONDUIT (IMC) SHALL MEET THE REQUIREMENTS OF ANSI C80.6.
 6. FURNISH AND INSTALL BUSHINGS, AS MANUFACTURED BY O.Z. OR T&B COMPANIES FOR ALL POWER SYSTEM CONDUITS AND LIGHTING CIRCUIT CONDUITS 1-1/4" AND LARGER.
 7. LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LTFMC): STEEL CONSTRUCTED OF SINGLE STRAP, FLEXIBLE CONTINUOUS, INTERLOCKED, AND DOUBLE-WRAPPED METAL WITH A LIQUID-TIGHT JACKET OF FLEXIBLE POLYVINYL CHLORIDE (PVC) CONFORMING TO NEMA RN1.
 8. RIGID NONMETALLIC CONDUIT (RNC) SHALL COMPLY WITH NEMA TC2, SCHEDULE 40 AND SCHEDULE 80 PVC. RNC FITTINGS SHALL COMPLY WITH NEMA TC3, MATCH TO CONDUIT TYPE AND MATERIAL.

B. BOXES

- 1. JUNCTION BOXES AND PULL BOXES SHALL HAVE SUFFICIENT VOLUME TO ACCOMMODATE THE NUMBER OF CONDUCTORS ENTERING THE BOX IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 70 ARTICLE 314. BOXES SHALL BE CADMIUM-PLATED OR ZINC-COATED SHEETMETAL, JUNCTION BOXES AND PULL BOXES FOR USE WITH THE CONDUIT SYSTEMS SHALL NOT BE LESS THAN 1 1/2" DEEP AND 4" BY 4". PULL AND JUNCTION BOXES SHALL BE FURNISHED WITH HINGED OR SCREW-FASTENED COVERS.

C. INSTALLATION

1. CONDUIT AND FITTINGS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 70 AND AS SPECIFIED HEREIN.
2. INSTALL RACEWAYS SQUARE WITH BUILDING WALLS AND FASTENED TO BUILDING STRUCTURE.
3. EMT SHALL BE INSTALLED INDOORS IN DRY LOCATIONS NOT SUBJECT TO MECHANICAL INJURY. ALSO, CONCEALED CIRCUITS AND CIRCUITS LOCATED IN PLENUM SHALL BE EMT UNLESS OTHERWISE NOTED.
4. RMC CONDUIT SHALL BE USED IN ALL OPEN SHOP AREAS TO A MINIMUM ELEVATION OF 15'-0" AFF.
5. RMC AND IMC WITH THREADED FITTINGS SHALL BE INSTALLED OUTDOORS, WHERE UNDERGROUND, OR IN AREAS SUBJECT TO WEATHER AND/OR MECHANICAL INJURY.
6. RNC SHALL BE INSTALLED OUTDOORS, WHERE UNDERGROUND, OR IN AREAS SUBJECT TO WEATHER AND/OR MECHANICAL INJURY. FOR RNC, USE SOLVENT-CEMENTED JOINTS IN DUCTS AND FITTINGS AND MAKE WATERTIGHT ACCORDING TO MANUFACTURERS WRITTEN INSTRUCTIONS. STAGGER COUPLINGS SO THOSE OF ADJACENT DUCTS DO NOT LIE IN THE SAME PLANE.
7. FMC AND LTFMC WITH SEPARATE GROUND WIRE SHALL BE INSTALLED IN AREAS SUBJECT TO VIBRATION IN MAXIMUM SIX FOOT LENGTHS PROPERLY SUPPORTED.
8. WHERE APPLICABLE, CONDUITS SHALL BE FASTENED TO ALL SHEET METAL BOXES, GUTTERS AND CABINETS WITH TWO LOCKNUTS AND A BUSHING.
9. THE CONTRACTOR SHALL FURNISH AND INSTALL ABOVE GRADE CONDUIT SYSTEMS AS SPECIFIED, INCLUDING ALL NECESSARY SUPPORTS, HANGERS, AND OTHER HARDWARE. IF THERE ARE ANY MAJOR DISCREPANCIES, CHANGES OR QUESTIONABLE ROUTING, THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE FOR RESOLUTION AND/OR APPROVAL.
10. EXPOSED CONDUIT SHALL BE NEATLY AND EVENLY SPACED AND SHALL RUN PARALLEL TO CEILING, FLOORS, WALLS OR OTHER PERMANENT STRUCTURES.
11. CONDUIT IN FINISHED AREAS SHALL BE INSTALLED CONCEALED.
12. CONDUIT SHALL BE SECURELY CLAMPED AND SUPPORTED AT LEAST EVERY 10 FEET VERTICALLY AND 8 FEET HORIZONTALLY. GALVANIZED PIPE STRAPS SHALL BE FASTENED TO STRUCTURE WITH BOLTS, SCREWS AND ANCHORS.
13. CONDUIT AND BOXES SHALL NOT BE SUPPORTED FROM T-BAR CEILING WIRES.
14. EXPANSION FITTINGS WITH FLEXIBLE GROUND STRAP SHALL BE PROVIDED IN CONDUIT RUNS CROSSING BUILDING EXPANSION JOINTS.
15. CONTRACTOR SHALL AVOID MORE THAN THREE 90 DEGREE BENDS, OR EQUIVALENT, IN A RUN BETWEEN PULL FITTINGS.
16. EMERGENCY LIGHTING SYSTEM WIRING SHALL BE IN RIGID CONDUIT, EMT OR SURFACE RACEWAY.

2.4 WIRING DEVICES

- A. WALL SWITCHES
 1. SWITCHES SHALL BE SPECIFICATION GRADE, 120/277 VOLTS, IVORY TOGGLE, 20 AMPS, HUBBELL OR APPROVED EQUAL. SWITCH LOCATIONS TO BE CONFIRMED WITH ARCHITECT/OWNER PRIOR TO ROUGHING-IN.
 2. SWITCHES TO BE LOCATED IN THE SAME GANGED PLATE WITH DIMMERS. SWITCHES SHALL MATCH THE SAME STYLE AS THE DIMMERS IN THE GANG.

- B. DIMMER SWITCHES
 1. DIMMERS SHALL BE BY LUTRON OR AN APPROVED EQUIVALENT. DIMMERS SHALL MATCH THE HOLE OPENING OF NEARBY NEIGHBORING SWITCHES. THEY SHALL BE SPECIFICATION GRADE, SLIDE TYPE OR BUTTON TYPE FOR RAISE AND LOWER FUNCTIONS. THEY SHALL BE RATED FOR 120 VOLTS OR 277 VOLTS AS APPLICABLE. THE RATED WATTAGE SHALL BE DEPENDENT UPON THE LIGHTING LOAD. DIMMERS TYPE SHALL MATCH THE LOAD TYPE THAT THEY ARE CONTROLLING - FLUORESCENT FOR FLUORESCENT DIMMING, ELECTRONIC LOW VOLTAGE FOR DIMMING ELECTRONIC TRANSFORMERS, VERIFY APPLICATION REQUIREMENTS WITH DIMMER MANUFACTURER. PROVIDE ACCESSORIES AND APPURTENANCES AS NECESSARY TO SUPPORT LARGER LOADS OR THOSE DIMMING APPLICATIONS WHICH REQUIRE INTERFACES. FLUORESCENT DIMMERS SHALL BE COMPATIBLE WITH THE FLUORESCENT DIMMING BALLASTS THEY ARE CONTROLLING. DIMMING-INTERFACES SHALL BE CONFIRMED WITH OWNER PRIOR TO ROUGHING-IN.

C. OCCUPANCY SENSORS

1. OCCUPANCY SENSORS SHALL BE DUAL TECHNOLOGY TYPE. THEY SHALL BE CEILING MOUNT AS INDICATED ON THE DRAWINGS.
2. THE OCCUPANCY SENSOR SHALL BE WHITE.
3. PROVIDE OCCUPANCY SENSOR SWITCH APPROPRIATELY COORDINATED WITH THE CEILING MOUNT OCCUPANCY SENSOR.
4. PROVIDE RIGID GALVANIZED AND APPURTENANCES AS NECESSARY TO CREATE A COMPLETE, OPERABLE SYSTEM.
5. SENSORS SHALL BE SET TO AUTOMATICALLY TURN OFF LIGHTS WITHIN 30 MINUTES OF ALL OCCUPANTS LEAVING THE SPACE.
6. SENSORS SHALL BE SET TO MANUAL ON OR CONTROLLED TO AUTOMATICALLY TURN ON THE LIGHTING TO NOT MORE THAN 50% POWER. FULL AUTOMATIC-ON CONTROLS SHALL BE PERMITTED TO CONTROL LIGHTING IN PUBLIC CORRIDORS, STAIRWAYS, RESTROOMS, AND BUILDING ENTRANCE AND LOBBY.
7. COMBINATION WALL BOX 0-10V DIMMERS/SWITCH/OCC SENSORS SHALL BE PIR TYPE WITH 180 DEG FIELD OF VIEW AND MINIMUM 1000 SQ FT OF MAJOR MOTION COVERAGE. IT SHALL BE COMPATIBLE WITH 0-10VDC LED/FLR LAMPS AND CAPABLE OF FUNCTIONING IN A 3-WAY SWITCHING ARRANGEMENT.
 - a. BASIS OF DESIGN IS EATON OSW-P-010, OR APPROVED EQUAL.
 - b. DEVICE COLOR SELECTION SHALL BE FROM MANUFACTURERS FULL RANGE. COLOR SELECTION SHALL BE BY ARCHITECT. THE FOLLOWING BASE COLOR COMBINATIONS SHALL BE UTILIZED:
 - BLACK DEVICE / STAINLESS STEEL PLATE
 - WHITE OUTLET / WHITE PLASTIC PLATE
 - GRAY OUTLET / GRAY PLASTIC WALL PLATE

D. SAFETY SWITCHES

1. SAFETY SWITCHES SHALL BE FUSED OR NON-FUSED AS REQUIRED. THEY SHALL BE THE HEAVY-DUTY TYPE AS MANUFACTURED BY SIEMENS, GENERAL ELECTRIC, SQUARE D OR APPROVED EQUAL. THE SAFETY SWITCHES SHALL HAVE A POSITIVE QUICK MAKE AND QUICK BREAK OPERATING MECHANISM WITH SAFETY INTERLOCKING COVER AND EXTERNAL OPERATING HANDLE.

E. RECEPTACLES

1. DUPLEX AND QUADRUPLUX RECEPTACLES SHALL BE FLUSH, HEAVY DUTY, GENERAL USE, 20A, 120V, GROUNDING TYPE, INDUSTRIAL SPECIFICATION GRADE AS MANUFACTURED BY HUBBELL OR APPROVED EQUAL, NEMA 5-20R CONFIGURATION. COLOR SHALL BE IVORY.
2. GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLES SHALL BE STRAIGHT BLADE, GENERAL USE, SPECIFICATION GRADE AS MANUFACTURED BY HUBBELL OR APPROVED EQUAL, NEMA 5-20 CONFIGURATION, 120V, COMPLYING WITH UL 498 AND UL 943. GFCI UNITS SHALL BE DESIGNED FOR INSTALLATION IN A 2 3/4" DEEP OUTLET BOX WITHOUT AN ADAPTER. COLOR SHALL BE IVORY.

- F. WALL SWITCHES, RECEPTACLE AND OTHER MISCELLANEOUS DEVICE PLATES
 1. DEVICE PLATES AND RECEPTACLE COVER PLATES SHALL BE LABELED (ON THE INSIDE) SHOWING THE CIRCUIT NUMBER.
 2. FOR LOCATIONS WHERE THERE ARE MULTIPLE DEVICES, THE COVER PLATE SHALL BE ONE SOLID PIECE TO SUIT THE DEVICES INSTALLED. ALL PLATES SHALL FIT SNUGLY AND TIGHTLY AGAINST THE FINISHED BUILDING'S SURFACES.
 3. FOR THE CASE OF DIMMERS GANGED TOGETHER, THE CONTRACTOR SHALL APPLY THE APPROPRIATE DERATING FACTORS AS THE MULTIPLE DIMMERS ARE GANGED TOGETHER.
 4. PLATES FOR SURFACE BOXES SHALL BE CADMIUM PLATED OR GALVANIZED.

G. BOXES AND FITTINGS

1. COMPLY WITH UL 514B, FITTINGS FOR CONDUIT AND OUTLET BOXES.
2. JUNCTION AND PULL BOXES SHALL BE INSTALLED WHERE SHOWN ON THE DRAWINGS, OR AT SUCH LOCATIONS AS MAY BE REQUIRED TO FACILITATE THE PULLING OF CABLES.
3. PULL BOXES SHALL BE FURNISHED AND INSTALLED ON CONDUIT RUNS LONGER THAN 100 FEET OR WITH MORE THAN THREE RIGHT-ANGLE BENDS.
4. OUTLET BOXES SHALL BE EQUIPPED WITH PLASTER RINGS, EXTENSION RINGS AND FIXTURE STUDS WHERE REQUIRED. ALL UNUSED OPENINGS IN BOXES SHALL BE CLOSED WITH FACTORY MADE KNOCKOUT SEALS.
5. BOXES AND ENCLOSURES SHALL BE SECURELY MOUNTED TO THE BUILDING STRUCTURE WITH SUPPORTING FACILITIES INDEPENDENT OF THE CONDUIT ENTERING OR LEAVING THE BOXES.

H. INSTALLATION

1. WIRING DEVICES SHALL BE INSTALLED AND TESTED TO VERIFY THE UNITS ARE WORKING AS INTENDED.
2. CONTRACTOR SHALL TROUBLESHOOT ANY DEVICES NOT FUNCTIONING PROPERLY OR AS INTENDED. CONTRACTOR SHALL EITHER RESTORE THE PROBLEMATIC DEVICE OR REPLACE IT IN LIKE KIND, RETEST UNTIL DEVICES ARE VERIFIED TO BE IN WORKING CONDITION.
3. BARRIERS BETWEEN ADJACENT DEVICES SHALL BE INSTALLED WHERE REQUIRED PER NEC 406.4(G).

2.6 ENCLOSED CIRCUIT BREAKERS AND SWITCHES

- A. CONTRACTOR SHALL PROVIDE AND INSTALL ENCLOSED BREAKERS AND SWITCHES WITH TRIP RATINGS, REQUIRED POLES AND VOLTAGES AS INDICATED ON THE DRAWINGS.
- B. UNITS SHALL BE MANUFACTURED BY SIEMENS, GENERAL ELECTRIC, SQUARE D OR APPROVED EQUIVALENT.
- C. ENCLOSURES SHALL COMPLY WITH NEMA AB 1 AND NEMA KS 1 TO MEET ENVIRONMENTAL CONDITIONS OF THE INSTALLED LOCATION. ENCLOSURES SHALL NEMA 250, TYPE I, UNLESS OTHERWISE INDICATED.
- D. COMPLY WITH APPLICABLE PORTIONS OF NECA 1, NEMA PB 1.1, AND NEMA PB 2.1 FOR INSTALLATION OF ENCLOSED SWITCHES AND CIRCUIT BREAKERS.

2.8 MOTOR CONTROLLERS

- A. MOTOR DISCONNECTING SWITCHES
 1. SHOULD ANY MOTORS BE LOCATED OUT OF SIGHT OR GREATER THAN 50 FEET FROM THEIR CONTROLLERS, THE CONTRACTOR SHALL FURNISH AND INSTALL A NON-FUSED SAFETY SWITCH IN CLOSE VICINITY TO THE MOTOR.

2.10 PANELBOARDS

- A. PANELBOARDS
 1. PANELBOARDS SHALL UTILIZE BOLT-ON BREAKERS. LOAD CENTERS ARE NOT PERMITTED. VOLTAGE, PHASE, NUMBER OF POLES AND MAIN BREAKER OR LUGS AS SHOWN ON THE CONTRACT DRAWINGS, WITH HINGED COVER, OVERSIZE BACKBOX.
 - a. THE A.I.C. RATING SHALL BE AS INDICATED ON THE DRAWING OR SHALL BE COORDINATED WITH THE UTILITY. THE PANELBOARD SHORT CIRCUIT RATING SHALL BE NO LESS THAN THE SUM OF THE SERVICE ENTRANCE FAULT CURRENT PLUS 3500A FOR MOTOR SHORT CIRCUIT CONTRIBUTION.
 2. THE "MDP" SHALL BE SERVICE ENTRANCE RATED.
 3. PANELBOARDS SHALL BE EQUIPPED WITH COPPER BUS.
 4. PROVIDE PANELBOARD WITH HINGED DOOR IN DOOR COVER.

B. CIRCUIT BREAKERS

1. MOLDED-CASE THERMAL-MAGNETIC CIRCUIT BREAKERS SHALL CONFORM TO NEMA AB1 AND COMPATIBLE WITH EXISTING PANELBOARDS.
2. CIRCUIT BREAKERS SHALL HAVE A MINIMUM INTERRUPTING RATING TO MATCH THAT OF THE PANELBOARD. CIRCUIT BREAKERS BE FULLY RATED. CIRCUIT BREAKERS MAY NOT BE SERIES RATED. CIRCUIT BREAKERS SHALL HAVE BOLTED CONNECTIONS TO THE BUS.

C. INSTALLATION

1. CONTRACTOR SHALL ADHERE TO ALL CLEARANCE REQUIREMENTS AS STATED IN THE NEC.
2. CONTRACTOR SHALL BALANCE PANELBOARD LOADS TO THE BEST OF THEIR ABILITY AND IN ACCORDANCE WITH NEC.
3. THE INSIDE OF THE PANEL SHALL BE EQUIPPED WITH A CARD HOLDER AND A TYPED INDEX CARD IDENTIFYING EACH CIRCUIT INSTALLED.
4. LABEL ALL NEUTRAL WIRES WITH ASSOCIATED CIRCUIT NUMBER.

2.15 INTERIOR LUMINAIRES

- A. A FIXTURE SHALL BE INSTALLED AT EACH LOCATION INDICATED ON DRAWINGS.
- B. EXIT SIGNS AND EMERGENCY BATTERY PACK FIXTURES SHALL BE CIRCUITED TO AN UNSWITCHED LEG OF THE ROOM CIRCUIT LIGHTING. WHERE EMERGENCY BATTERY PACK FIXTURES ARE NOT PROVIDED, BALLAST BATTERY PACKS SHALL BE INSTALLED IN VARIOUS LOCATIONS INDICATED ON THE DRAWINGS. INSTALLATION OF EXIT SIGNS AND EMERGENCY LIGHT SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 70 AND NFPA 72.
- C. LED LIGHT FIXTURES SHALL BE IN ACCORDANCE WITH IES, NFPA, UL, AS SHOWN ON THE DRAWINGS, AND AS SPECIFIED.
- D. LED LIGHT FIXTURES SHALL BE REDUCTION OF HAZARDOUS SUBSTANCES (ROHS)-COMPLIANT.
- E. LED DRIVERS SHALL INCLUDE THE FOLLOWING FEATURES UNLESS OTHERWISE INDICATED:
 1. MINIMUM EFFICIENCY: 85% AT FULL LOAD.
 2. MINIMUM OPERATING AMBIENT TEMPERATURE: -20° C. (-4° F.)
 3. INPUT VOLTAGE: 120 - 277V (+10%) AT 60 HZ.
 4. INTEGRAL SHORT CIRCUIT, OPEN CIRCUIT, AND OVERLOAD PROTECTION.
 5. POWER FACTOR: ≥ 0.95.
 6. TOTAL HARMONIC DISTORTION: ≤ 20%.
 7. COMPLY WITH FCC 47 CFR PART 15.

K. LED MODULES SHALL INCLUDE THE FOLLOWING FEATURES UNLESS OTHERWISE INDICATED:

1. COMPLY WITH IES LM-79 AND LM-80 REQUIREMENTS.
2. MINIMUM CRI 80 AND COLOR TEMPERATURE 3500° K UNLESS OTHERWISE SPECIFIED IN LIGHTING FIXTURE SCHEDULE.
3. MINIMUM RATED LIFE: 50,000 HOURS PER IES L70.
4. LIGHT OUTPUT LUMENS SHALL MATCH BASIS OF DESIGN FIXTURE.



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PART 3 - EXECUTION

3.1 EXECUTION

- A. MATERIALS AND EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS INDICATED... B. INSTALLATION SHALL CONFORM TO ALL LOCAL CODES AND INDUSTRY STANDARDS... C. CONTRACTOR SHALL DELIVER A COMPLETE AND OPERATIONAL SYSTEM... D. CHANGES TO THE ELECTRICAL INSTALLATION SHALL BE APPROVED BY THE FACILITY ENGINEER... E. CONTRACTOR SHALL DELIVER AN "AS-BUILT" ELECTRICAL DRAWING... F. ALL WIRING FOR THE CONNECTION OF MOTORS AND CONTROL EQUIPMENT... G. CONTRACTOR SHALL COMPLY WITH OSHA 191.150 "LOCKOUT AND TAGOUT PROCEDURE"... H. INSTALLATIONS ARE NOT COMPLETE UNTIL TESTED AND OPERATIONAL... I. FIELD TESTING

Table with columns: PANEL, MOUNTING, PHASE, WIRE, VOLTAGE, AIC, and a grid of circuit descriptions, breakers, wires, and conductors.

Table with columns: PANEL, MOUNTING, PHASE, WIRE, VOLTAGE, AIC, and a grid of circuit descriptions, breakers, wires, and conductors.

- 2.16 EXTERIOR LUMINAIRES
A. A FIXTURE SHALL BE INSTALLED AT EACH LOCATION INDICATED ON DRAWINGS.
B. NEW LAMPS OF THE PROPER TYPE AND WATTAGE SHALL BE INSTALLED IMMEDIATELY PRIOR TO SUBSTANTIAL COMPLETION OF THE PROJECT.
C. FIXTURE HOUSINGS AND BALLAST ENCLOSURES SHALL BE SUITABLE FOR OUTDOOR USE.
D. BALLASTS SHALL BE CAPABLE OF FUNCTIONING DESPITE ANY LOW OUTDOOR TEMPERATURES.
E. LIGHTS SHALL BE CONTROLLED VIA CONTACTOR CONNECTED TO AN AUTOMATIC TIME CLOCK WITH DAYLIGHT SAVINGS AND PHOTOCCELL.

- 2.17 FIRE ALARM SYSTEMS
A. FIRE ALARM INSTALLATION SHALL BE IN ACCORDANCE WITH NFPA 72.
B. MANUFACTURER SHALL BE SIMPLEX, EDWARDS SYSTEM TECHNOLOGY (EST) OR APPROVED EQUAL...
C. FIRE ALARM SIGNAL INITIATION SHALL BE BY ONE OR MORE OF THE APPLICABLE FOLLOWING DEVICES...
D. FIRE ALARM SIGNAL SHALL INITIATE THE ALL OF THE APPLICABLE FOLLOWING ACTIONS...
E. SYSTEM TROUBLE SIGNAL INITIATION SHALL BE BY ONE OR MORE OF THE FOLLOWING DEVICES OR ACTIONS...
F. SYSTEM TROUBLE AND SUPERVISORY SIGNAL ACTIONS...
G. MANUAL PULL STATIONS SHALL BE ADDRESSABLE...
H. HORN/STROBE UNITS SHALL BE WALL MOUNTED...
I. SMOKE DETECTORS SHALL BE PHOTOELECTRIC TYPE...
J. ELECTRICAL CONTRACTOR SHALL PROVIDE DUCT TYPE SMOKE DETECTORS...
K. STROBES, HORNS AND HORN/STROBE UNITS SHALL BE PROVIDED...
L. HEAT DETECTOR FIXED TEMPERATURE SENSING SHALL BE INDEPENDENT...
M. THE KITCHEN HEAT DETECTORS SHALL BE PROGRAMMABLE...
N. THE ELEVATOR SHAFT HEAT DETECTOR SHALL BE PROGRAMMABLE...
O. THE KITCHEN HEAT DETECTORS SHALL BE PROGRAMMABLE...
P. ALL WIRING SHALL BE AS RECOMMENDED BY THE FIRE ALARM SYSTEM MANUFACTURER...
Q. CABLING SHALL BE PLENUM RATED...
R. CONTRACTOR SHALL SUBCONTRACT TO SYSTEM MANUFACTURER FOR PROGRAMMING AND FINAL SYSTEM CHECKOUT AND TEST.

- 2.14 SYSTEM COMMISSIONING
A. PROVIDE COMMISSIONING IN ACCORDANCE WITH IECC REQUIREMENTS.
B. FUNCTIONAL TESTING SHALL BE COMPLETED FOR THE FOLLOWING:
1. OCCUPANCY SENSORS...
2. TIME-SWITCH CONTROLS...
3. DAYLIGHT RESPONSIVE CONTROLS...
4. DIMMING CONTROLS...
C. DOCUMENTATION SHALL INCLUDE DATE AND TIME OF TESTS...
D. DOCUMENTS CERTIFYING THE INSTALLED LIGHTING CONTROLS MEET DOCUMENTED PERFORMANCE CRITERIA...

Table with columns: PANEL, MOUNTING, PHASE, WIRE, VOLTAGE, AIC, and a grid of circuit descriptions, breakers, wires, and conductors.

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Table with columns: Date, No., Description, and a grid for revisions.

SEAL:
DRAWING NAME: ELECTRICAL SPECIFICATION AND SCHEDULES

WOODLANDS AT GREYSTONE
SCULTHORPE DR. WEST GOSHEN TOWNSHIP
CHESTER COUNTY, PA

Project number: 18-053
date: 2019-11-27
scale: 1/2" = 1'-0"
sheet no.

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GENERAL NOTES:

1. CONFIRM WALLS WITH MOUNTED WATER CLOSETS/URINALS ARE FRAMED LARGE ENOUGH TO ACCEPT FIXTURE CARRIERS.

NOTES BY SYMBOL: (4)

(THIS DRAWING ONLY)

(1) --



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REVISIONS	Description	Date	No.	chk'd by

SEAL:

WOODLANDS AT GREYSTONE
 SCULTHORPE DR. WEST GOSHEN TOWNSHIP
 CHESTER COUNTY, PA

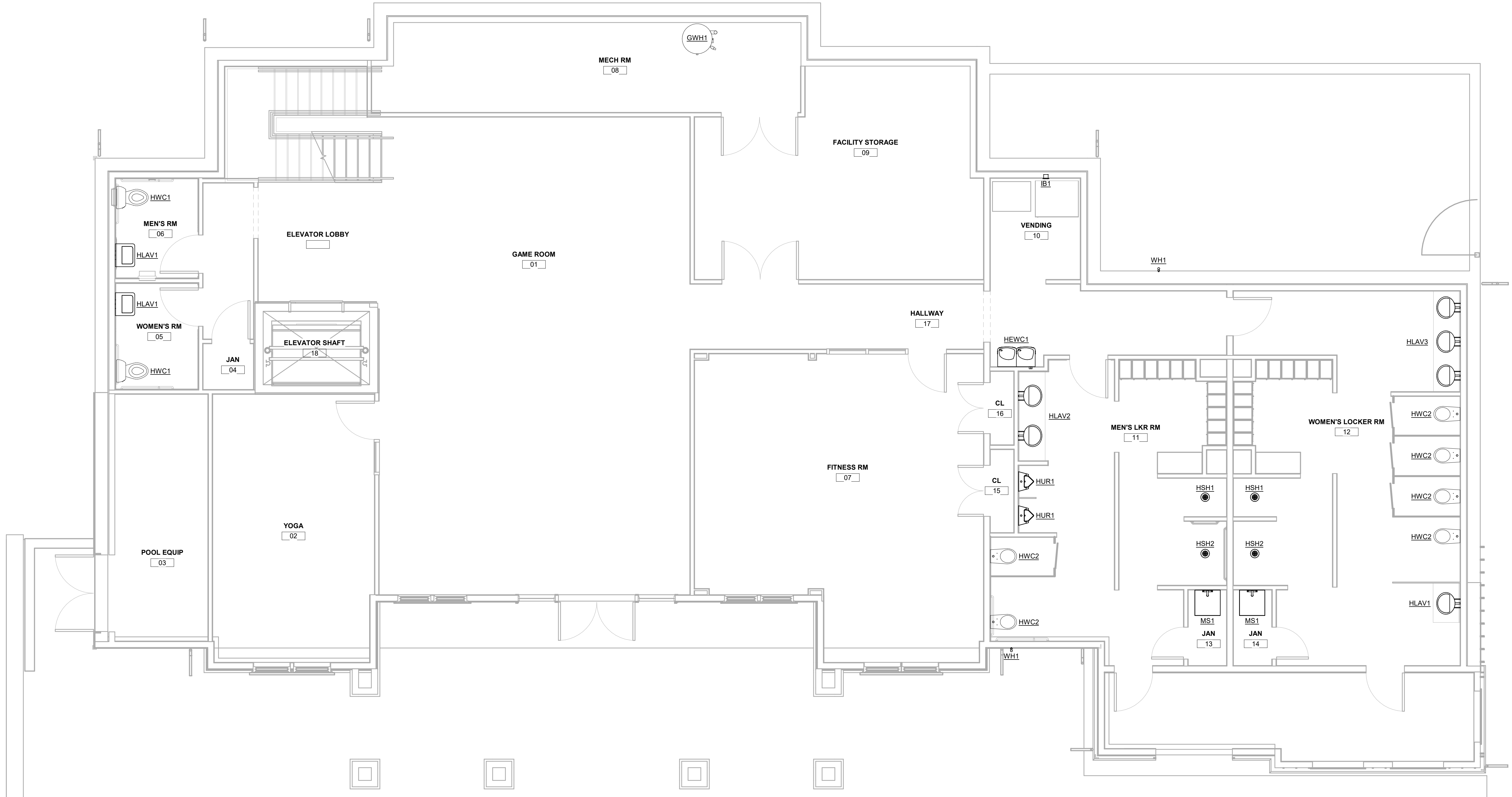
DRAWING NAME: FIRST FLOOR PLAN - DOMESTIC WATER

LOCATION:

Project number: 18-053	Drawn by: Author
date: 2019-11-27	chk'd by: Checker
scale: 1/4" = 1'-0"	approv. by: Approver
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1 FIRST FLOOR PLAN - DOMESTIC WATER
SCALE: 1/4" = 1'-0"

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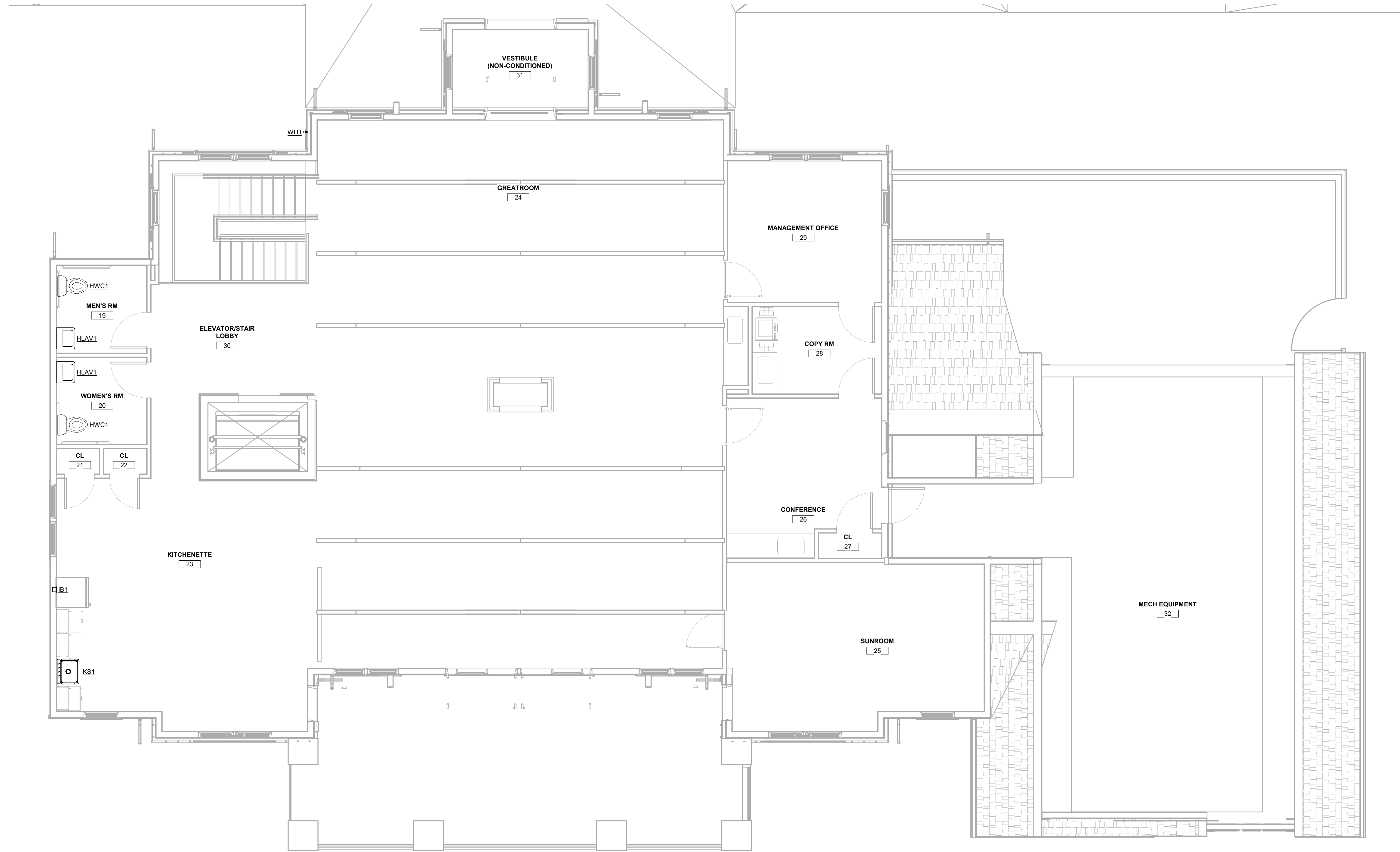
GENERAL NOTES:

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NOTES BY SYMBOL: (P)

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① SECOND FLOOR PLAN - DOMESTIC WATER
SCALE: 1/4" = 1'-0"



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DRAWING NAME: SECOND FLOOR PLAN - DOMESTIC WATER
WOODLANDS AT GREYSTONE
 SCULTHORPE DR. WEST GOSHEN TOWNSHIP
 CHESTER COUNTY, PA
 LOCATION:

Project number: 18-053	Drawn by: Author
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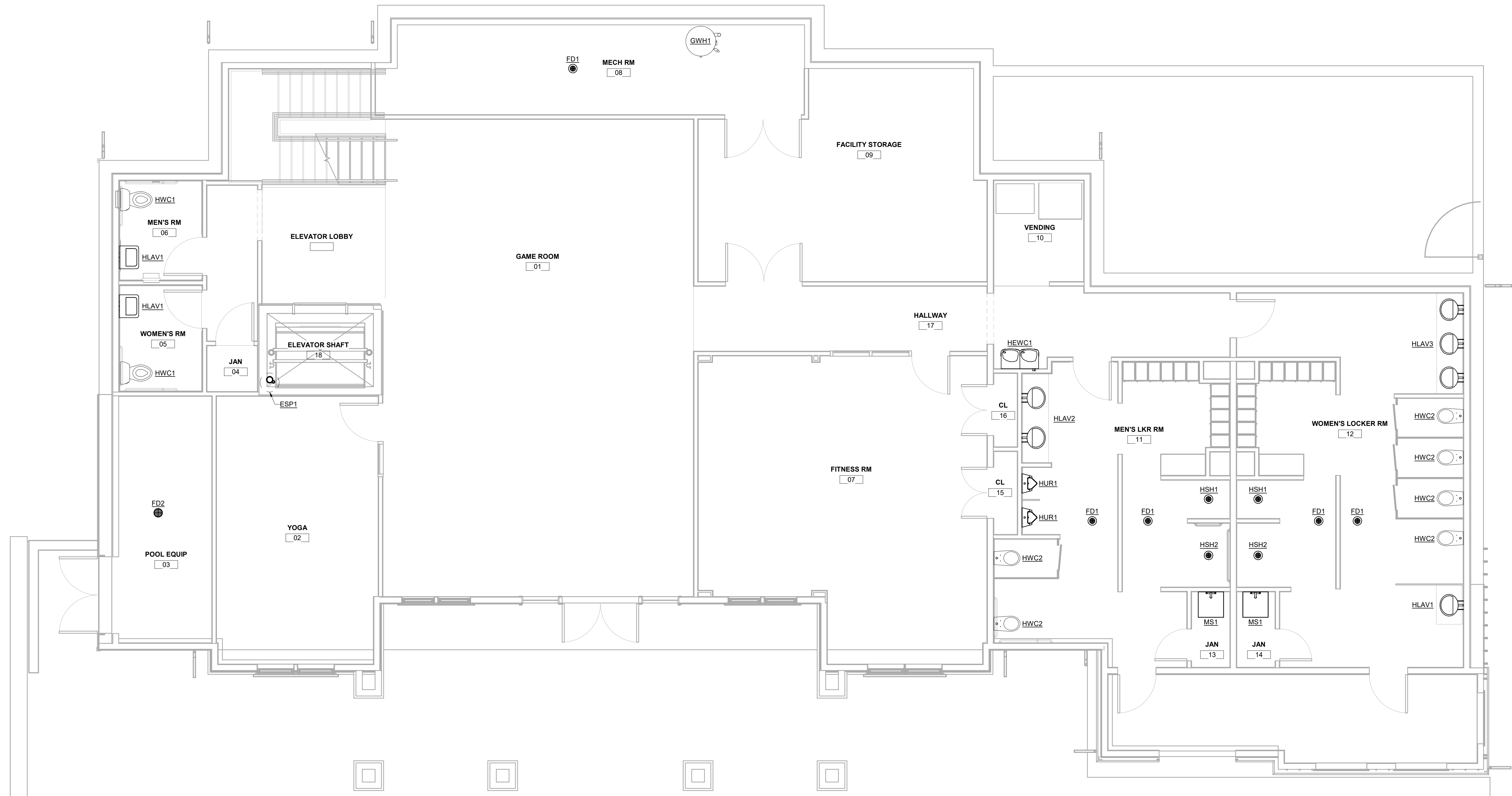
GENERAL NOTES:

1. CONFIRM WALLS WITH MOUNTED WATER CLOSETS/URINALS ARE FRAMED LARGE ENOUGH TO ACCEPT FIXTURE CARRIERS.

NOTES BY SYMBOL: (1)

(THIS DRAWING ONLY)

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1 FIRST FLOOR PLAN - SANITARY
SCALE: 1/4" = 1'-0"



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WOODLANDS AT GREYSTONE
SCULTHORPE DR. WEST GOSHEN TOWNSHIP
CHESTER COUNTY, PA

DRAWING NAME: FIRST FLOOR PLAN - SANITARY

LOCATION:

Project number: 18-053	Drawn by: Author
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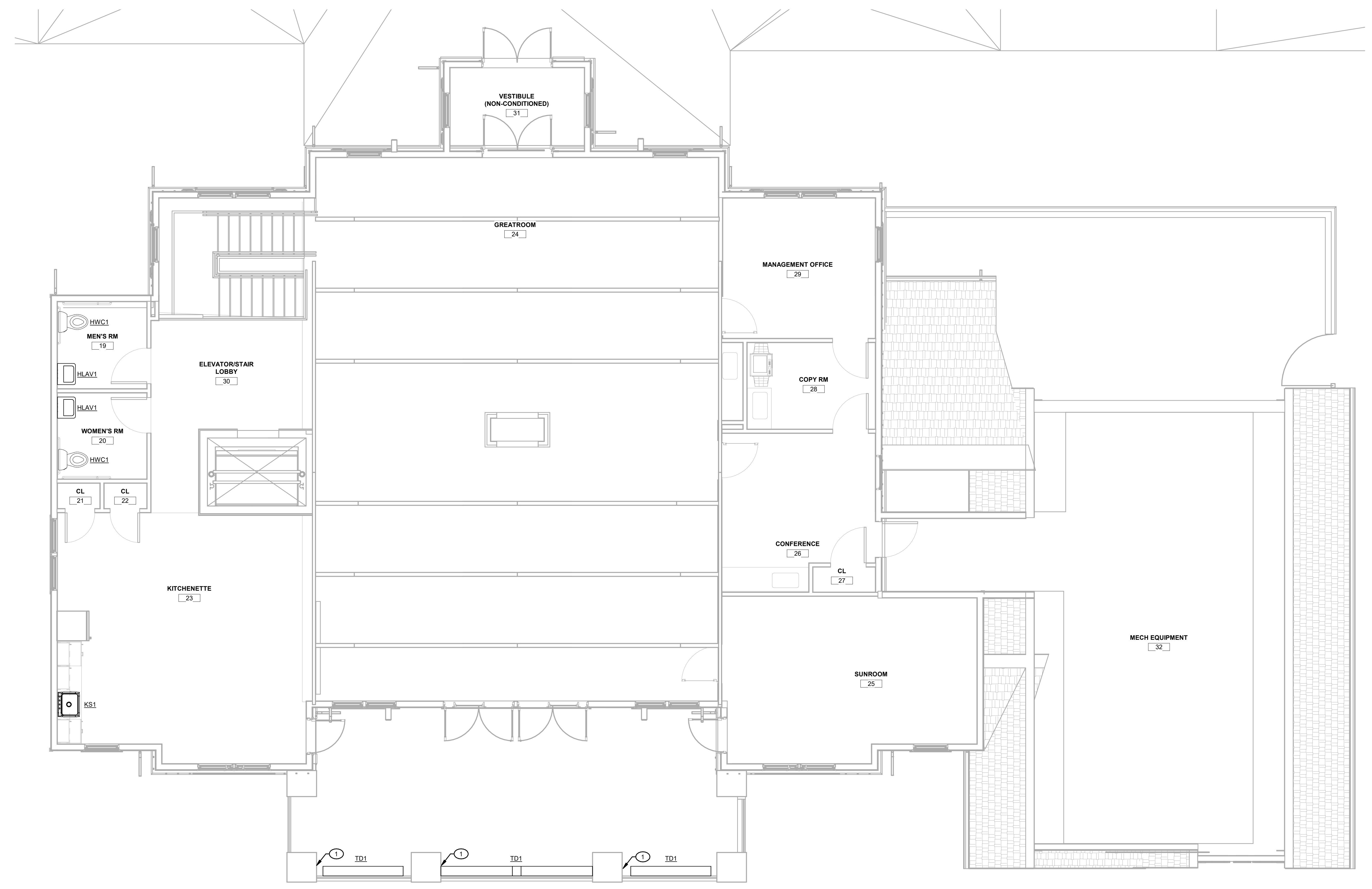
GENERAL NOTES:

1. --

NOTES BY SYMBOL: (P)

(THIS DRAWING ONLY)

- (1) PIPE TRENCH DRAIN DOWN COLUMN BELOW & DISCHARGE TO DECK BELOW VIA SPLASH BLOCK. COORDINATE DISCHARGE LOCATION AND DIRECTION WITH ARCHITECT.



(1) SECOND FLOOR PLAN - SANITARY
SCALE: 1/4" = 1'-0"



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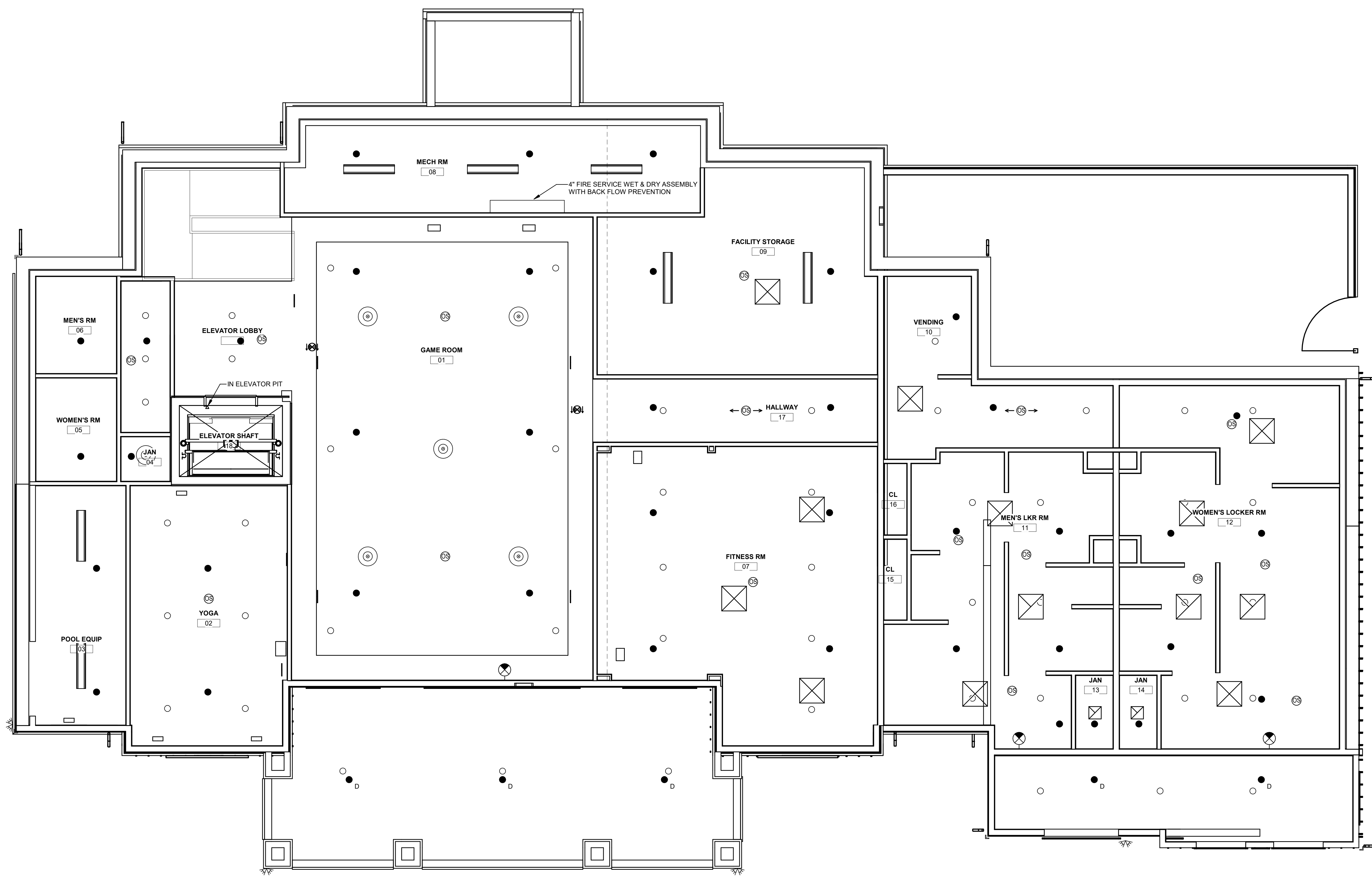
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 CHESTER COUNTY, PA

DRAWING NAME: SECOND FLOOR PLAN - SANITARY

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1 FIRST FLOOR PLAN - FIRE PROTECTION
SCALE: 1/4" = 1'-0"

BARRY ISETT & associates
ARCHITECTURAL ENGINEERS AND CONTRACTORS

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REVISIONS	Description	chk'd by
No.	Date	

SEAL:

DRAWING NAME: FIRST FLOOR PLAN - FIRE PROTECTION
WOODLANDS AT GREYSTONE
SCULTHORPE DR. WEST GOSHEN TOWNSHIP
CHESTER COUNTY, PA

Project number: 18-053	Drawn by: Author
date: 2019-11-27	chk'd by: Checker
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