

ABBREVIATIONS

A	AMPERE	NC	NORMALLY CLOSED
AC	ALTERNATING CURRENT	NEG	NEGATIVE
ACR	CONTROL RELAY "A" (TYP)	NEU	NEUTRAL
AF	ABOVE FINISHED FLOOR	NIC	NOT IN CONTRACT
AFS	ABOVE FINISHED GRADE	NO	NORMALLY OPEN
AI	ANALOG INPUT (PLC)	NTS	NOT TO SCALE
AIC	AMPERE INTERRUPTING CAPACITY	OH	OVERHEAD
AL	ALUMINUM	OL	OVERLOAD
AO	ANALOG OUTPUT (PLC)	OQA	ON-OFF-AUTOMATIC
ASYM	ASYMMETRICAL	OSY	OUTSIDE STEM AND YOKE VALVE (FA SYSTEM)
ATC	AUTOMATIC TEMPERATURE CONTROL	P	POLE
ATS	AUTOMATIC TRANSFER SWITCH	PB	PUSHBUTTON
AUX	AUXILIARY	PC	PERSONAL COMPUTER
AWG	AMERICAN WIRE GAUGE	PE	PRESSURE ELEMENT
BFG	BELOW FINISHED GRADE	PF	POWER FACTOR
BKR	BREAKER	PH	PHASE
BOS	BOTTOM OF STEEL	PIT	PRESSURE INDICATOR TRANSMITTER
C	CONDUIT	PLC	PROGRAMMABLE LOGIC CONTROLLER
CATV	CABLE TELEVISION	PNL	PANEL
CB	CIRCUIT BREAKER	PRI	PRIMARY
CCF	CARTON CANISTER FILTER	PT	POTENTIAL TRANSFORMER
CI	CONTROL INTERLOCK	PT	PRESSURE TRANSMITTER
CKT	CIRCUIT	PVC	POLYVINYL CHLORIDE
CP	CONTROL PANEL	Q	LOAD KW INDICATOR
CR	CONTROL RELAY	R	REMOTE
CPT	CONTROL POWER TRANSFORMER	RGS	RIGID GALVANIZED STEEL CONDUIT
CT	CURRENT TRANSFORMER	RL	RED INDICATING LIGHT (TYP)
CU	COPPER	R	B-BLUE, C-GREEN, A-AMBER
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER	RSC	RIGID STEEL CONDUIT
DB	DIRECT BURIED	RTD	RESISTANCE TEMPERATURE DETECTOR
DBH	DIESEL BLOCK HEATER	RVS5	REDUCED VOLTAGE SOLID STATE
DC	DIRECT CURRENT	S	SURFACE
DI	DIGITAL INPUT (PLC)	SED	SECONDARY
DISC	DISCONNECT	SF	SUPPLY FAN
DN	DOWN	SHLD	SHIELDED CABLE
DO	DIGITAL OUTPUT (PLC)	SI	SPEED INDICATOR
EC	ELECTRICAL CONTRACTOR	SN	SOLID NEUTRAL
EF	EXHAUST FAN	SP	SPARE
EG	EQUIPMENT GROUND	STP	SHIELDED TWISTED PAIR
EH	ELECTRICALLY HEATED	STT	SHIELDED TWISTED TRIPLET
EM	EMERGENCY	SV3	3 WAY VALVE
EMT	ELECTRICAL METALLIC TUBING	SW	SWITCHBOARD
EO	ELECTRICALLY OPERATED	SWD	SWITCHGEAR
EP	EXPLOSION PROOF CL 1 DIV 1 GR D	SWGR	SYMMETRICAL
EPR	ETHYLENE PROPYLENE RUBBER	SYM	SYMMETRICAL
EQUIP	EQUIPMENT	T	TRANSFORMER
ES	EMERGENCY STOP	TB	TERMINAL BLOCKS
EWC	ELECTRIC WATER COOLER	TOS	TOP OF STEEL
EX	EXTERIOR	TS	THERMOSTAT
EXTG	EXISTING	TC	COOLING THERMOSTAT
F	FIELD	TD	TEL DIALER
FA	FIRE ALARM	TDR	TIME DELAY RELAY
FAC	FIRE ALARM ANNUNCIATOR	TE	TEMPERATURE ELEMENT
FACP	FIRE ALARM CONTROL PANEL	TEL	TELEPHONE
FBD	FURNISHED BY OTHERS	TF	FREEZE STAT
FD	FOOT-CANDLE	TH	HUMIDISTAT
FE	FLOW ELEMENT	TIT	TEMPERATURE INDICATING TRANSMITTER
FIT	FLOW INDICATOR TRANSMITTER	TL	TEMPERATURE LOW
FLUOR	FLOUORESCENT	TOA	THERMOSTAT OUTSIDE AIR
FS	FLOW SWITCH	TRANSF	TRANSFORMER
FTR	FIN TUBE RADIATOR	TS	THERMOSTAT
FU	FUSE	TS	TEMPERATURE SWITCH
FWE	FURNISHED WITH EQUIPMENT	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
FVNR	FULL VOLTAGE NON REVERSING	TWS	TWISTED SHIELDED CABLE
FVR	FULL VOLTAGE REVERSING	UG	UNDERGROUND
GCP	GENERATOR CONTROL PANEL	UH	UNIT HEATER
GEN	GENERATOR	UPS	UNINTERRUPTABLE POWER SUPPLY
GF	GROUND FAULT	V	VOLT
GFI	GROUND FAULT CIRCUIT INTERRUPTER	VA	VOLT-AMPERE
GND	GROUND	VAR	VOLT-AMPERE REACTIVE
HH	HAND HOLE	VFD	VARIABLE FREQUENCY DRIVE
HD	HIGH INTENSITY DISCHARGE	VPS	VACUUM PRESSURE SWITCH
HIT	HIGH INTENSITY TUNGSTEN	W	WIRE
HOA	HAND-OFF-AUTOMATIC	WH	WATT HOUR
HP	HORSE POWER	WM	WATT METER
HPS	HIGH PRESSURE SODIUM	WP	WEATHERPROOF
HTR	HEATER	XLP	CROSS LINKED POLYETHYLENE
HV	HIGH VOLTAGE	ZSC	LIMIT SWITCH CLOSED
HVAC	HEATING VENTILATING AIR CONDITIONING	ZSD	LIMIT SWITCH OPEN
HW	HOT WATER		
HWV	HOT WATER VALVE		
HZ	HERTZ		
IC	ISOLATED GROUND		
IMC	INTERMEDIATE METAL CONDUIT		
INCAND	INCANDESCENT		
JB	JUNCTION BOX		
K	KILO		
KCMIL	THOUSAND CIRCULAR MILS		
KV	KILOVOLT		
KVA	KILOVOLT-AMPERE		
KVAR	KILOVOLT-AMPERE REACTIVE		
KW	KILOWATT		
KWH	KILOWATT-HOUR		
L	LOCAL		
LA	LIGHTING ARRESTER		
LCS	LOCAL CONTROL STATION		
LE	LEVEL ELEMENT		
LJ	LEVEL INDICATOR		
LT	LEVEL INDICATOR TRANSMITTER		
LP	LIGHTING PANEL		
LPS	LOW PRESSURE SODIUM		
LSW	LIGHT SWITCH		
LS	LEVEL SWITCH		
LT	L-LOW, H-HIGH, LL-LOW LOW, HH-HIGH HIGH		
LTP	LEVEL TRANSMITTER		
LV	LOW VOLTAGE		
MC	METAL CLAD		
MCB	MAIN CIRCUIT BREAKER		
MCC	MOTOR CONTROL CENTER		
MCP	MOTOR CIRCUIT PROTECTOR		
MFR	MANUFACTURER		
MI	MINERAL INSULATED		
NH	MANHOLE		
NLD	MAIN LUG ONLY		
NO	MECHANICALLY OPERATED		
MOD	MOTOR OPERATED DAMPER		
MOV	MOTOR OPERATED VALVE		
MTD	MOUNTED		
MTS	MANUAL TRANSFER SWITCH		
MVA	MEGAVOLT-AMPERE		

GROUNDING

	GROUND ROD
	EXOTHERMIC WELD CONNECTION
	BOLTED CONNECTION
	BARE COPPER CONDUCTOR RUN EXPOSED
	BARE COPPER CONDUCTOR EMBEDDED IN CONCRETE OR BURIED

POWER

	DESCRIPTION
	UNFUSED SAFETY SWITCH, RATING AS NOTED
	FUSED SAFETY SWITCH, RATING AS NOTED
	MAGNETIC MOTOR STARTER, RATING AS NOTED
	COMBINATION TYPE MAGNETIC MOTOR STARTER, RATING AS NOTED
	PUSHBUTTON OR SELECTOR SWITCH STATION
	MAINTAINED RED MUSHROOM-HEAD EMERGENCY STOP P.B.
	SOLENOID
	MOTOR OPERATED DAMPER
	LIGHTING OR POWER CONTRACTOR
	ENCLOSED CIRCUIT BREAKER
	THERMOSTAT
	COOLING ONLY THERMOSTAT
	DUCT-MOUNTED UTILITY METER
	PANELBOARD, SURFACE MTD.
	PANELBOARD, FLUSH MTD.
	EQUIPMENT, TERMINAL, OR CONTROL CABINET
	MOTOR
	TRANSFORMER
	PAD MOUNTED TRANSFORMER
	ELECTRIC WATER HEATER
	ELECTRICAL HANDHOLE
	JUNCTION BOX
	PRESSURE SWITCH
	ELECTRIC ACTUATED VALVE

LIGHTING FIXTURES

	DESCRIPTION
	FLUORESCENT FIXTURE, 2x4 SURFACE TROFFER TYPE
	CIRCUIT (37) FIXTURE (N) SWITCH (h)
	FLUORESCENT FIXTURE, STRIP, OPEN REFLECTOR, ENCLOSED OR WRAPAROUND TYPE
	INCANDESCENT WALL MOUNTED FIXTURE
	INCANDESCENT CEILING FIXTURE
	INCANDESCENT LIGHT WITH GLOBE AND GUARD
	H.I.D. WALL MOUNTED FIXTURE
	H.I.D. CEILING FIXTURE
	EXIT SIGN, CEILING MOUNTED ARROW
	EXIT SIGN, WALL MOUNTED SHADING INDICATES SIGN FACE
	EMERGENCY LIGHTING BATTERY UNIT WITH 2 LAMP HEADS
	REMOTE EMERGENCY LIGHTING 1 OR 2 LAMP HEADS
	POLE MOUNTED SITE LIGHT

WIRING

	DESCRIPTION
	WIRING, CONCEALED IN FINISHED AREAS, EXPOSED WHERE PERMITTED BY SPECIFICATIONS
	WIRING INSTALLED IN OR BELOW FLOOR SLAB
	HOME RUN TO PANEL (CKT. NO. AS SHOWN)
	HOME RUN (NO. REFERS TO COND. & WIRE SCHED.)
	DC WIRING
	CONDUIT AND WIRE
	CONDUIT DOWN
	CONDUIT UP

SINGLE LINE DIAGRAM

	DESCRIPTION
	AMMETER
	TRANSFORMER
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	FRAME SIZE CIRCUIT BREAKER
	TRIP AMPS
	SURGE CAPACITOR
	LIGHTNING ARRESTER
	COMBINATION MOTOR STARTER AND BREAKER
	AUTOTRANSFORMER-TYPE MOTOR STARTER
	REVERSING MOTOR STARTER
	TWO-SPEED TWO-WINDING MOTOR STARTER
	REDUCED VOLTAGE SOLID-STATE MOTOR STARTER
	DELTA CONNECTION
	WYE CONNECTION
	GROUND CONNECTION
	MOTOR (HP AS SHOWN)
	GENERATOR
	TRANSFER SWITCH
	EMERGENCY STOP MUSHROOM SWITCH (RED)
	TRANSIENT VOLTAGE SURGE SUPPRESSOR

SCHEMATIC DIAGRAM

	DESCRIPTION
	MANUAL MOTOR STARTER, D/L, RL FRACTIONAL H.P.
	CONTROL RELAY
	MOTOR CONTACTOR
	CONTACT NORMALLY OPEN
	CONTACT NORMALLY CLOSED
	OVERLOAD HEATER ELEMENT
	SINGLE POLE SINGLE THROW SWITCH
	SELECTOR SWITCH
	START PUSHBUTTON, MOMENTARY CONTACT
	STOP PUSHBUTTON, MOMENTARY CONTACT
	RED MUSHROOM-HEAD MAINTAINED-TYPE EMERGENCY STOP PUSHBUTTON
	LIMIT SWITCH
	TEMPERATURE SWITCH
	FLOAT SWITCH
	PRESSURE SWITCH
	TIMED CONTACT
	PILOT LIGHT, LETTER INDICATES COLOR
	GREEN
	RED
	AMBER

WIRING DEVICES

	DESCRIPTION
	20 AMPERE, 120 VOLT DUPLEX RECEPTACLE
	GF 20 AMPERE, 120 VOLT DUPLEX RECEPTACLE
	INDICATES INCHES AFF MOUNTING HEIGHT
	WEATHERPROOF
	ISOLATED GROUND
	COUNTER TOP
	20 AMPERE, 120 VOLT QUAD RECEPTACLE
	20 AMPERE, 120 VOLT SINGLE RECEPTACLE
	CLOCK OUTLET
	SINGLE SPECIAL PURPOSE RECEPTACLE
	INDICATES AMPERE SIZE
	PLUGMOLD
	SINGLE POLE WALL SWITCH
	DOUBLE POLE SWITCH
	THREE WAY SWITCH
	FOUR WAY SWITCH
	NEDN PILOT LIGHT
	WEATHERPROOF
	KEY OPERATED
	EXPLOSION PROOF
	DIMMER SWITCH
	MOTOR RATED

TELEPHONE/PAGING/INTERCOM SYSTEM

	DESCRIPTION
	PAGING SPEAKER, CEILING MTD.
	PAGING HORN, WALL MTD.
	TELEPHONE OUTLET RJ11
	TELEPHONE RJ11/DATA RJ45
	WALL MOUNTED

FIRE ALARM SYSTEM

	DESCRIPTION
	MANUAL PULL STATION
	AUDIO/VISUAL ALARM STATION
	VISUAL ALARM
	CANDELA RATING (ADA)
	SMOKE DETECTOR
	HEAT DETECTOR
	TEMP RATING
	DUCT-MOUNTED SMOKE DETECTOR, REMOTE ALARM & TEST
	FIRE ALARM SYSTEM CONTROL PANEL
	FIRMATIC SWITCH
	SPRINKLER SYSTEM TAMPER SWITCH
	FIRE ALARM ANNUNCIATOR

NEMA CLASSIFICATIONS FOR ELECTRICAL EQUIPMENT AND ENCLOSURES

ROOM NO.	ROOM NAME	NEMA RATING
	EXISTING PROCESS BUILDING - BASEMENT	
	ODOR CONTROL ROOM *	4X
	CHEMICAL STORAGE ROOM	4X
	EXISTING CHEMICAL ROOM	4X
	CORRIDORS	1
	EXISTING PROCESS BUILDING - FIRST FLOOR	
	DAF ROOM	4X
	ODOR CONTROL ROOM *	4X
	CORRIDORS	1
	SCREENINGS ROOM	7(CL. 1, DIV. 1, GRP. D)
	PRIMARY SEDIMENTATION BASINS	
	INTERIOR, AND EXTERIOR ENVELOPE TO 18 INCHES ABOVE WALL & EXTENDING 18 INCHES BEYOND WALL, AND EXT. ENVELOPE 18 INCHES ABOVE GRADE EXTENDING 10 FEET HORIZONTALLY FROM TANK WALLS	7(CL. 1, DIV. 2, GRP. D)
	AREAS NOT IN CLASSIFIED AREAS ABOVE	4X
	TUNNEL & PUMP GALLERY	1
	OUTDOOR - GENERAL	4X
	* ALL AREAS WITHIN 3 FEET OF ODOR CONTROL EXHAUST DUCT OPENINGS, FLEX CONNECTIONS, AND OTHER POTENTIAL LEAKAGE POINTS	7(CL. 1, DIV. 2, GRP. D)

GENERAL NOTES

- ALL CONDUIT AND EQUIPMENT SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE CURRENT NATIONAL ELECTRICAL CODE.
- CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY ONLY AND SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURES. CONDUITS SHALL BE CONCEALED IN WALLS, AND ABOVE ANY SUSPENDED CEILING WHERE APPLICABLE. EXPOSED CEILING CONDUITS SHALL BE PERMITTED WHERE SUSPENDED CEILING ARE NOT USED. EXPOSED CONDUITS SHALL BE INSTALLED PARALLEL TO BEAMS AND WALLS.
- CONDUITS SHALL BE PROPERLY TERMINATED WITH NEAT CONNECTIONS TO ALL ASSOCIATED EQUIPMENT.
- CONTROL AND INSTRUMENTATION CONDUIT SIZES AND NUMBER OF CONDUCTORS ARE TO BE DETERMINED FROM SCHEMATIC DIAGRAMS, INSTRUMENTATION DIAGRAMS, AND/OR SPECIFICATIONS, IF NOT DIRECTLY SHOWN ON POWER PLANS, THE WIRING DIAGRAMS, QUANTITY AND SIZE OF WIRES AND CONDUIT REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL AND INSTRUMENTATION EQUIPMENT. MODIFICATIONS REVIEWED AND NO EXCEPTIONS TAKEN BY THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND SPECIFICATIONS. EACH CONTROL AND INSTRUMENTATION CONDUIT SHALL ALSO CONTAIN 10 PER CENT SPARE CONDUCTORS, WITH A MINIMUM OF TWO SPARES, UP TO THE LIMIT OF CONDUIT FILL AS SPECIFIED BY THE NATIONAL ELECTRICAL CODE. INSTRUMENTATION SHIELDED CABLES SHALL BE INSTALLED IN RGS CONDUIT, SEPARATE FROM OTHER POWER WIRING.
- EACH CONDUIT TO CARRY GROUND WIRE(S) ACCORDING TO SPECIFICATION #15460, IN ADDITION TO NUMBER OF CONDUCTORS SHOWN ON DRAWINGS OR PER NOTE 4 ABOVE. ALL GROUNDING MUST CONFORM TO ARTICLE 250 OF CURRENT NATIONAL ELECTRICAL CODE.
- MINIMUM CONDUIT SIZE SHALL BE 75°C. MINIMUM POWER WIRING SHALL BE 20#12 AWG WITH GROUND, AND 20#14 FOR CONTROL INSTRUMENTATION CABLE SHALL BE 20#18 TWS AND 30#16 TWS FOR SPEED POTENTIOMETER, LIGHTING, RECEPTACLE, AND HVAC MAY BE .5" CONDUIT INSTALLED PER NEC. PROVIDE CONDUIT AND WIRING AS INDICATED.
- ALL PANELBOARDS SHALL BE MOUNTED SO THAT THE DISTANCE FROM THE TOP CIRCUIT BREAKER OPERATING HANDLE TO FINISHED FLOOR SHALL NOT EXCEED 6'-6".
- ALL SURFACE MOUNTED PANELS AND PANELBOARDS ON THE INSIDE OF EXTERIOR WALLS ABOVE GRADE, OR IN OTHER LOCATIONS CONSIDERED AS DAMP, SHALL BE MOUNTED TO MAINTAIN A 1/4" AIR SPACE BETWEEN THE ENCLOSURE AND THE WALL.
- ELECTRICAL EQUIPMENT LOCATIONS ARE APPROXIMATE ONLY. COORDINATE LOCATIONS WITH PROCESS PIPING, ARCHITECTURAL, STRUCTURAL, AND MECHANICAL DRAWINGS. CONTRACTOR SHALL COORDINATE MANUFACTURERS EQUIPMENT REQUIREMENTS WITH SPACE AVAILABLE. FINAL CONTROL PANEL LOCATIONS SHALL BE FIELD COORDINATED.
- ALL FIELD CONTROL CONDUCTORS WILL TERMINATE AT INDIVIDUAL TERMINAL BLOCKS WITHIN THE CONTROL ENCLOSURE. SERIES AND PARALLEL CONNECTION OF FIELD CONTROL CONDUCTORS WILL BE MADE ONLY AT CONTROL PANEL OR MOTOR CONTROL CENTER TERMINAL BLOCKS.
- GROUND ALL CONDUCTOR SHIELDS AT PANEL ONLY - DO NOT GROUND SHIELDS AT BOTH ENDS.
- AT THE FOLLOWING LOCATIONS, UNLESS OTHERWISE NOTED, PULL, JUNCTION, TERMINAL, SWITCH, AND OUTLET BOXES SHALL BE CAST IRON WHERE STEEL CONDUIT IS TERMINATED; OR SHALL BE CAST ALUMINUM WHERE ALUMINUM CONDUIT IS TERMINATED:
 - A - AT LOCATIONS WHERE VAPORTIGHT LIGHTING FIXTURES AND/OR WATERTIGHT RECEPTACLES ARE INDICATED.
 - B - AT LOCATIONS ON OR IN ALL OUTSIDE WALLS.
 - C - OUTDOORS
- NAMEPLATES SHALL CONFORM STRICTLY TO INSTRUCTIONS IN THE ELECTRICAL SPECIFICATIONS AND ON THE DRAWINGS. THE FOLLOWING SHALL HAVE NAMEPLATES:
 - A - ALL MAIN BREAKERS AND TIE BREAKERS.
 - B - ALL COMPARTMENTS OF MOTOR CONTROL CENTERS EXCLUDING UNUSED COMPARTMENTS.
 - C - ALL LOCAL CONTROL STATIONS AT OR NEAR EQUIPMENT.
 - D - ALL PANELBOARDS.
 - E - GANGED LIGHT SWITCHES.
- PIPE SLEEVES FOR CONDUITS PASSING FROM NON-HAZARDOUS AREAS TO HAZARDOUS AREAS SHALL HAVE CALKING APPLIED TO MAKE THE INSTALLATION GASTIGHT.
- CONTRACTOR SHALL PROVIDE ALL DISCONNECTS AND SERVICE RECEPTACLES FOR HVAC AS REQUIRED BY NEC.
- CONTRACTOR SHALL PROVIDE ALL CONDUIT, WIRING, EQUIPMENT, AND CONTROL DEVICES AS INDICATED BY SCHEMATICS, SINGLE LINE DIAGRAMS, SCHEDULES, PLANS, SPECIFICATIONS, AND VENDOR DOCUMENTATION TO PROVIDE A COMPLETE WORKING SYSTEM. SINCE NOT ALL HOME RUNS ARE SHOWN ON PLANS, THE CONTRACTOR SHALL REFERENCE ALL SINGLE LINE AND SCHEMATIC DIAGRAMS, SCHEDULES, AND VENDOR DOCUMENTATION TO DETERMINE CONDUIT AND WIRING REQUIREMENTS.
- PROVIDE CONDUIT FREEZE EXPANSION FITTINGS FOR ALL EXTERIOR CONDUIT SYSTEMS.
- EXACT NUMBER, LOCATION, HORSEPOWER, VOLTAGE, AND PHASE OF ALL MOTORS AND DEVICES ASSOCIATED WITH THE ODOR CONTROL SYSTEM, CHEMICAL FEED SYSTEM, PRIMARY SEDIMENTATION BASINS, AND OTHER EQUIPMENT SYSTEMS AS APPLICABLE, PROVIDED UNDER THIS CONTRACT SHALL BE COORDINATED WITH THE ACTUAL EQUIPMENT SUPPLIER, CONDUIT AND WIRING TO BE PROVIDED SHALL BE ADJUSTED ACCORDING