ONE-LINE DIAGRAM LEGEND

1500KVA
2.4KVD-480Y/277
30, 60HZ — TRANSFORMER WITH PRIMARY AND SECONDARY VOLTAGE, AND KVA RATING AS NOTED

20 — 22: 3#8,#10G,2" — CIRCUIT NO.22 WITH #8 INSULATED CONDUCTORS, 1#10 BARE GROUND WIRE ALL IN 2" CONDUIT TO 20 HP MOTOR

15 — AUXILIARY ITEMS MAY NOT BE SHOWN COMPLETELY — ONE-LINE SHOWING POWER AND CONTROL TO A PACKAGE UNIT, AS FOR EXAMPLE A STEAM GENERATOR OR AN AIR HANDLING UNIT, SHALL IMPLY THAT ANY AND ALL ASSOCIATED EQUIPMENT SHALL ALSO BE INSTALLED AND WIRED AS REQUIRED BY THE EQUIPMENT FURNISHED.

INDICATES THAT ALL OR PART OF CIRCUIT MAY BE ROUTED IN DUCT BANK OR UNDERGROUND. CONDUIT SIZE SHOWN ON ONE-LINE IS ABOVE GROUND AND/OR INSIDE OF STRUCTURE. SEE DUCT BANK SCHEDULE AND SECTIONS FOR CONDUIT SIZE OF UNDERGROUND PORTION OF CIRCUIT.

HIGH VOLTAGE DRAWOUT AIR OR VACUUM CIRCUIT BREAKER

3P-20 — LOW VOLTAGE AIR CIRCUIT BREAKER, 3 POLE, 20 AMPERE

S4 — SIZE 4 COMBINATION MAGNETIC MOTOR STARTER

LOW VOLTAGE DRAWOUT AIR CIRCUIT BREAKER

HIGH VOLTAGE DRAWOUT CONTACTOR

FUSE AND DISCONNECT SWITCH

S2 — SIZE 2 COMBINATION MAGNETIC MOTOR STARTER, REVERSING OR 2 SPEED

S1 — SIZE 1 COMBINATION REDUCED VOLTAGE STARTER

POTENTIAL TRANSFORMER

CURRENT TRANSFORMER

CONDUIT & WIRING INSTALLATION LEGEND

CONDUIT EXPOSED

CONDUIT CONCEALED

CONDUIT TURNING UP. CONDUIT TURNING DOWN.

CONDUIT PLUGGED FLUSH. CONDUIT CAPPED.

L2-5 — TYPICAL FOR HOME RUN TO BE ROUTED TO LIGHTING PANEL L2 & CONNECTED TO CIRCUIT #5 (MINIMUM NO. 12 AWG CONDUCTORS AND 3/4" CONDUIT)

A — LIGHTING FIXTURE. REFER TO NUMBER OR LETTER IN FIXTURE SCHEDULE

11 — FLUORESCENT FIXTURE. REFER TO NUMBER OR LETTER IN FIXTURE SCHEDULE.

LP1-3 — RECEPTACLE POWERED FROM LIGHTING PANEL LP1, CIRCUIT 3

A LP2-2 — LIGHTING FIXTURE POWERED FROM LIGHTING PANEL LP2, CIRCUIT 2 (NON-SWITCHED)

LPA-4 A / 11 — LIGHTING FIXTURE POWERED FROM LIGHTING PANEL LPA, CIRCUIT 4, VIA SWITCH A

E — UNDERGROUND CONCRETE ENCASED ELECTRICAL DUCT BANK

UNDERGROUND CONCRETE ENCASED ELECTRICAL BANK ROUTED BENEATH SLAB-ON-GRADE

EE — DIRECT BURIED CONDUIT

GROUND CONDUCTOR

SCHEMATIC SYMBOLS

WIRE CONNECTION POINT

EXTERNAL CONNECTION POINT

NORMALLY OPEN CONTACT

NORMALLY CLOSED CONTACT

STARTER, CONTACTOR OR RELAY COIL

NORMALLY OPEN PUSH BUTTON

NORMALLY CLOSED PUSH BUTTON

MAINTAINED PUSH BUTTON

NORMALLY CLOSED GEARED LIMIT SWITCH

NORMALLY OPEN GEARED LIMIT SWITCH

INDICATING LIGHT

FUSE

POTENTIOMETER

CAPACITOR

DIODE

RESISTOR

CONTROL POWER TRANSFORMER

SWITCH

MS — MANUAL STARTER

OL — OVERLOAD

ELECTRODE

FLOAT SWITCH (CLOSING ON RISING LEVEL)

FLOAT SWITCH (OPENING ON RISING LEVEL)

P — PRESSURE SWITCH (CLOSING ON RISING PRESSURE)

P — PRESSURE SWITCH (OPENING ON RISING PRESSURE)

V — VACUUM SWITCH (CLOSING ON INCREASING VACUUM)

V — VACUUM SWITCH OPENING ON INCREASING VACUUM)

T — TEMPERATURE SWITCH (CLOSING ON RISING TEMPERATURE)

T — TEMPERATURE SWITCH (OPENING ON RISING TEMPERATURE)

FLOW ACTUATED SWITCH (CLOSING ON INCREASE IN FLOW)

FLOW ACTUATED SWITCH (OPENING ON INCREASE IN FLOW)

ON TIME DELAY CONTACT (NORMALLY OPEN, WHEN THE COIL IS ENERGIZED THE CONTACT WILL CLOSE AFTER A TIME DELAY)

ON TIME DELAY CONTACT (NORMALLY CLOSED, WHEN THE COIL IS ENGERGIZED THE CONTACT WILL OPEN AFTER A TIME DELAY)

OFF TIME DELAY CONTACT (NORMALLY OPEN, WHEN THE COIL IS DE-ENERGIZED THE CONTACT WILL OPEN AFTER A TIME DELAY)

OFF TIME DELAY CONTACT (NORMALLY CLOSED, WHEN THE COIL IS DE-ENERGIZED THE CONTACT WILL CLOSE AFTER A TIME DELAY)

TORQUE SWITCH (NORMALLY OPEN)

TORQUE SWITCH (NORMALLY CLOSED)

LIMIT SWITCH (NORMALLY OPEN)

LIMIT SWITCH (NORMALLY OPEN, HELD CLOSED)

LIMIT SWITCH (NORMALLY CLOSED)

LIMIT SWITCH (NORMALLY CLOSED, HELD OPEN)

DIFFERENTIAL PRESSURE SWITCH (NORMALLY OPEN, CLOSING ON INCREASING DIFF.)

DIFFERENTIAL PRESSURE SWITCH (NORMALLY CLOSED, OPENING ON INCREASING DIFF.)

MISCELLANEOUS SYMBOLS

BELL

HORN

T — THERMOSTAT

J — JUNCTION BOX

GROUND ROD

GROUND ROD WITH TEST WELL

GROUND CONNECTION

DISCONNECT SWITCH

COMBINATION STARTER

POWER PANEL

LIGHTING PANEL

MISCELLANEOUS PANEL

LIGHTING CONTACTOR

COMMUNICATION SYMBOLS

HORN SPEAKER

DUAL HORN SPEAKER

WALL MOUNTED CONE SPEAKER

SK — CEILING MOUNTED CONE SPEAKER

WS WP — WALL STATION

DS — DESK TOP STATION

RH WP — REMOTE HANDSET

SA — SPEAKER AMPLIFIER

LB — LINE BALANCE ASSEMBLY

TG — TONE GENERATOR

TI — TELEPHONE INTERFACE

IA — INTERFACE AMPLIFIER

IJB — INTERCOM JUNCTION BOX

NOTE: WP=WEATHERPROOF H=HAZARDOUS AREA

SWITCH & OUTLET SYMBOLS

S	SINGLE POLE SWITCH	S_{PL}	SWITCH WITH PILOT LIGHT		DUPLEX RECEPTACLE 120 VOLT		120 VOLT DUPLEX RECEPTACLE (UPS)
S_2	TWO POLE SWITCH	S_{KO}	KEY OPERATED SWITCH		SIMPLEX RECEPTACLE		DUPLEX FLOOR OUTLET
S_3	THREE-WAY SWITCH	S_{XP}	EXPLOSION PROOF SWITCH		RANGE RECEPTACLE		TELEPHONE OUTLET
S_4	FOUR-WAY SWITCH	S_{DM}	DIMMER SWITCH		TWISTLOCK RECEPTACLE		TELEPHONE FLOOR OUTLET
S_M^{C1}	MOMENTARY SWITCH CONTROLLING CONTACTOR C1	S_{3A}	THREE-WAY SWITCH CONTROLLING LIGHTS WITH "A" DESIGNATION	30	240V, 1Ø RECEPTACLE, TYPICAL AMPERE RATING NOTED	CX	COAXIAL CABLE OUTLET
S_{WP}	WEATHERPROOF SWITCH			60	480V, 3Ø WELDING RECEPTACLE, TYPICAL AMPERE RATING NOTED		

ABBREVIATIONS

A	AMBER, AMPERE, ALARM
AC	ALTERNATING CURRENT
ACB	AIR CIRCUIT BREAKER
AF	AMPERE FRAME
AFD	ADJUSTABLE FREQUENCY DRIVE
AM	AMMETER
ANN	ANNUNCIATOR
AR	ALARM RELAY
AS	AMMETER SWITCH
AT	AMPERE TRIP
AWG	AMERICAN WIRE GAGE
BC	BATTERY CHARGER
BR	BRAKE
BT	BEARING TEMPERATURE
C	CLOSE, COUNTER OR CONTACTOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CB"A"	CIRCUIT BREAKER AUXILIARY CONTACT (OPEN WHEN BREAKER IS OPEN OR TRIPPED CLOSED WHEN BREAKER IS CLOSED)
CB"B"	CIRCUIT BREAKER AUXILIARY CONTACT (CLOSED WHEN BREAKER IS OPEN OR TRIPPED OPEN WHEN BREAKER IS CLOSED)
CD	CONTROL DAMPER
CI	CELL INTERLOCK
CKT	CIRCUIT
CL2	CHLORINE
COS	CABLE OPERATED SWITCH
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CURRENT OR CONTROL RELAY
CS	CONTROL STATION
CT	CYCLE TIMER OR CURRENT TRANSFORMER
CTC	CYCLE TIMER CLUTCH
CTM	CYCLE TIMER MOTOR
2/C	2 CONDUCTOR
4"C	4" CONDUIT
DC	DIRECT CURRENT
DI	DOOR INTERLOCK
DM	DAMPER MOTOR OR DEMAND METER
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DPR	DIFFERENTIAL PRESSURE REGULATOR
DPS	DIFFERENTIAL PRESSURE SWITCH
DS	DISCONNECT SWITCH
DVLS	DISCHARGE VALVE LIMIT SWITCH
E	ELECTRIC OPERATOR FOR CONTROL DAMPER OR VALVE
EC	EMPTY CONDUIT
EL	ELEVATION OR EMERGENCY LIGHT
EMH	ELECTRICAL MANHOLE
ER	ELECTRODE RELAY
ES	END SWITCH
ETM	ELAPSED TIME METER
EX	EXISTING
F	FORWARD
FS	FLOW SWITCH
G	GREEN OR GROUND
GD	GROUND DETECTOR
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GLS	GEARED LIMIT SWITCH
#8G	#8 GROUND WIRE
H	HIGH OR HUMIDISTAT
HC	HOT CIRCUIT
HH	HANDHOLE
HMT	HIGH MOTOR TEMPERATURE
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HP	HORSEPOWER
HWCO	HIGH WATER CUTOFF
HZ	HERTZ (CYCLE)
I/O	INPUT/OUTPUT
INST	INSTANTANEOUS
J	JUNCTION BOX
JB	JUNCTION BOX
K	KEY INTERLOCK
KCMIL	THOUSAND CIRCULAR MIL
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KVAR	KILOVAR
KW	KILOWATT
KWH	KILOWATT HOUR
L	LOW, LEVEL
LA	LIGHTNING ARRESTER
LAN	LOCAL AREA NETWORK
LC	LIGHTING CONTACTOR
LOA	LOCAL-OFF-AUTO
LOR	LOCAL-OFF-REMOTE
LP	LIGHTING PANEL
LS	LIMIT OR LEVEL SWITCH
LWCO	LOW WATER CUTOFF
1-1PR#18S	ONE, SINGLE PAIR, TWISTED, SHIELDED #16 CABLE
3-7/C#14	THREE, SINGLE, SEVEN CONDUCTOR #14 MULTICONDUCTOR CONTROL CABLES

M	MAGNETIC MOTOR STARTER
MA	MILLIAMPERE
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCLU	MOTOR CONTROL LINEUP
MD	MOISTURE DETECTOR
MFM	MAGNETIC FLOW METER
MFR	MANUFACTURER
MH	MANHOLE OR MOUNTING HEIGHT
MOV	MOTOR OPERATED VALVE
MPR	MOTOR PROTECTION RELAY
MS	MANUAL MOTOR STARTER
MSH	MOTOR SPACE HEATER
MV	MILLIVOLT
MVA	MEGA VOLT AMPERE
N	NEUTRAL
NC	NORMALLY CLOSED
NO	NORMALLY OPEN, NUMBER
O	OPEN
OCB	OIL CIRCUIT BREAKER
OL	OVERLOAD
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
P	PRIMARY
PCS	PLANT CONTROL SYSTEM
PB	PUSH BUTTON OR PULL BOX
PF	POWER FACTOR METER
PH	PHASE, CHEMICAL TERM
PLC	PROGRAMMABLE LOGIC CONTROLLER
PP	POWER PANEL
PRS	PROXIMITY SWITCH
PS	PRESSURE SWITCH
PT	POTENTIAL TRANSFORMER, PROGRAM TIMER
2P	2 POLE
R	RED, RAISE, RELAY OR REVERSE
RECP	RECEPTACLE
RES	RESISTOR
RT	REPEATING TIMER
RTD	RESISTANCE TYPE TEMP DETECTOR
RTU	REMOTE TERMINAL UNIT
RVSS	REDUCED VOLTAGE SOLID STATE STARTER
S2	SIZE 2 STARTER
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SH	SPACE HEATER
SN	SOLID NEUTRAL
SO	SOLENOID OILER
SP	SINGLE POLE
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SS	SELECTOR SWITCH
SSS	SOLID STATE STARTER
SUPV	SUPERVISORY CONTROL
SV	SOLENOID VALVE
SWB	SWITCHBOARD
SWGR	SWITCHGEAR
T	THERMOSTAT, TIMER, OR TOTALIZER
TACH	TACHOMETER
TB	TERMINAL BLOCK
TC	TIMER CLUTCH
TD	TIME DELAY RELAY
TEMP	TEMPERATURE
TM	TIMER MOTOR
TQ	TORQUE
TS	TEMPERATURE SWITCH
TTB	TELEPHONE TERMINAL BOX
UG	UNDERGROUND
UV	UNDER VOLTAGE
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTS
VA	VOLT AMPERE
VAR	VARMETER
VLS	VALVE LIMIT SWITCH
VM	VOLTMETER
VPI	VALVE POSITION INDICATOR
VS	VOLTMETER SWITCH
W	WHITE OR WATTS
WH	WATTHOUR METER
WM	WATT METER
WP	WEATHERPROOF
WPI	WEATHERPROOF IN-USE
X	AUXILIARY RELAY
XFMR	TRANSFORMER
XP	EXPLOSION PROOF
Y	YELLOW
Z	AUXILIARY RELAY
ZS	POSITION SWITCH
ZSS	ZERO SPEED SWITCH

AREA DESIGNATIONS

THE SPECIAL AREA DESIGNATION BOXES, AS DEFINED BELOW, ARE LOCATED ON THE PLAN DRAWINGS TO DEFINE ELECTRICAL INSTALLATION REQUIREMENTS. DESIGNATION BOXES ARE LOCATED WITHIN ROOM OR BELOW ROOM NUMBER. ALL INDOOR AREAS NOT INDICATED OTHERWISE ARE AREA TYPE 1 AND MINIMUM NEMA TYPE 1 ENCLOSURES.

AREA TYPE 1A	CORROSIVE CHEMICAL FEED AND STORAGE ROOMS. CONDUIT SYSTEM SHALL BE EXPOSED PVC RIGID NON-METALLIC CONDUIT WITH PVC FITTINGS, BOXES, AND ACCESSORIES.
AREA TYPE 4	INDOOR WET LOCATIONS SUCH AS VAULTS, HOSEDOWN AREAS, BASEMENTS, ETC. MINIMUM NEMA TYPE 4 ENCLOSURE FOR EQUIPMENT AND GASKETED FITTINGS IN A CONDUIT SYSTEM.
AREA TYPE 7A	CLASS I, DIVISION 1 AREA AS DEFINED BY NEC. ALL EQUIPMENT AND CONDUIT SYSTEMS SHALL BE RATED FOR USE IN THIS AREA.
AREA TYPE 7B	CLASS I, DIVISION 2, GROUP C AND D (METHANE, GASOLINE) AS DEFINED BY NEC. EQUIPMENT AND CONDUITS SYSTEMS SHALL BE RATED FOR USE IN THIS AREA.
AREA TYPE 12	INDOOR, DRY, DIRTY AREA. REQUIRES MINIMUM NEMA TYPE 12 GASKETED ENCLOSURES FOR ALL EQUIPMENT AND GASKETED FITTINGS IN CONDUIT SYSTEMS.

GENERAL REQUIREMENTS

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ROUTING ALL CONDUITS NOT SHOWN ON THE PLANS. THIS SHALL INCLUDE ALL CONDUITS SHOWN ON THE ONE-LINES AND HOME-RUNS SHOWN ON THE PLAN DRAWINGS. CONDUITS SHALL BE ROUTED AS DEFINED IN THE SPECIFICATIONS.
2. SPARE WIRES SHALL BE TAPED AND COILED.
3. IF EQUIPMENT SUPPLIED BY MANUFACTURER HAS A LARGER LOAD THAN VALUE SHOWN, THE CABLE CONDUIT AND ELECTRICAL EQUIPMENT SHALL BE ENLARGED, AS REQUIRED, TO ACCOMMODATE THE HIGHER VALUE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING PROPERLY SIZED STARTER OVERLOADS FOR EQUIPMENT FURNISHED.
5. LIGHTING AND RECEPTACLE CIRCUITS DESIGNATED ON THE FLOOR PLANS ARE NOT SHOWN ON THE ONE-LINES. CONDUCTORS FOR LIGHTING, RECEPTACLES, AND MISCELLANEOUS 120VAC CIRCUITS SHALL BE MINIMUM NO. 12 AWG. CONDUIT FOR LIGHTING, RECEPTACLES, AND MISCELLANEOUS 120VAC CIRCUITS SHALL BE MINIMUM 3/4".
6. IN AREAS WHERE THERE ARE OVERHEAD BRIDGE CRANES, HOISTS, ETC., NO CONDUITS SHALL BE RUN OVERHEAD THAT WILL INTERFERE WITH THE OPERATION OF THE EQUIPMENT.

GENERAL NOTES

1. SOLID LINES (————) INDICATE NEW WORK OR EQUIPMENT.
2. SCREENED LINES ( ) INDICATE EXISTING WORK OR EQUIPMENT.
3. DASHED LINES (– – – – –) INDICATE FUTURE WORK OR EQUIPMENT.
4. REFER TO THE FOLLOWING DRAWING(S) FOR INSTRUMENTATION LEGEND: I-1, I-2, I-3
5. THIS IS A GENERAL LEGEND SHEET. SOME SYMBOLS AND ABBREVIATIONS MAY NOT BE UTILIZED ON THIS SPECIFIC PROJECT.
6. INFORMATION RELATED TO CIRCUIT IDENTIFICATION, WIRE & CONDUIT SIZES, AND ROUTING, IS ON THE FOLLOWING DRAWING TYPES.
   A. ONE-LINE DIAGRAMS SHOW CIRCUIT IDENTIFICATION, WIRE QUANTITY AND SIZES, AND CONDUIT SIZE WITHIN STRUCTURES. ONE-LINE DIAGRAMS ALSO INDICATE ORIGIN AND DESTINATION OF CIRCUITS, AND IDENTIFY CIRCUITS ROUTED UNDERGROUND.
   B. FOR CIRCUITS WITHOUT UNDERGROUND PORTIONS, BUILDING FLOOR PLANS SHOW LOCATION OF EQUIPMENT FOR DETERMINING CIRCUIT LENGTH WITHIN THE STRUCTURE. FOR CIRCUITS WITH UNDERGROUND PORTIONS, ANTICIPATED PENETRATION OF UNDERGROUND CONDUITS ARE SHOWN ON STRUCTURE PLANS FOR DETERMINING THE LENGTH OF THE IN-STRUCTURE PORTIONS OF CIRCUITS. BUILDING FLOOR PLANS MAY ALSO SHOW HOME RUNS FOR LIGHTING, RECEPTACLE, AND OTHER MISCELLANEOUS EQUIPMENT CIRCUITS.
   C. SITE PLANS INDICATE THE GENERAL ROUTING OF UNDERGROUND CONDUITS AND DUCT BANKS. CIRCUITS ROUTED IN UNDERGROUND CONDUITS OR DUCT BANKS ARE INDICATED IN DUCT BANK SECTIONS REFERENCED ON THE SITE PLAN.
   D. DUCT BANK SECTIONS AND SCHEDULES IDENTIFY CONDUIT SIZE CONDUIT MATERIAL, ARRANGEMENT OF THE UNDERGROUND CONDUITS, AND CIRCUITS ROUTED IN EACH UNDERGROUND CONDUIT.

WTP

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NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
0	ZKO	SDS		12/04/15	ISSUED FOR CONSTRUCTION

90.3040 - Electrical Drawings
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DWG VER: 1000
XREF1:
XREF2:
XREF3:
XREF4:

WASHINGTON — STATE OF WASHINGTON — SCOTT E. STOCKKA — LIC. NO. 0402-032079 — 12-04-15 — PROFESSIONAL ENGINEER

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BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
LEGEND & ABBREVIATIONS

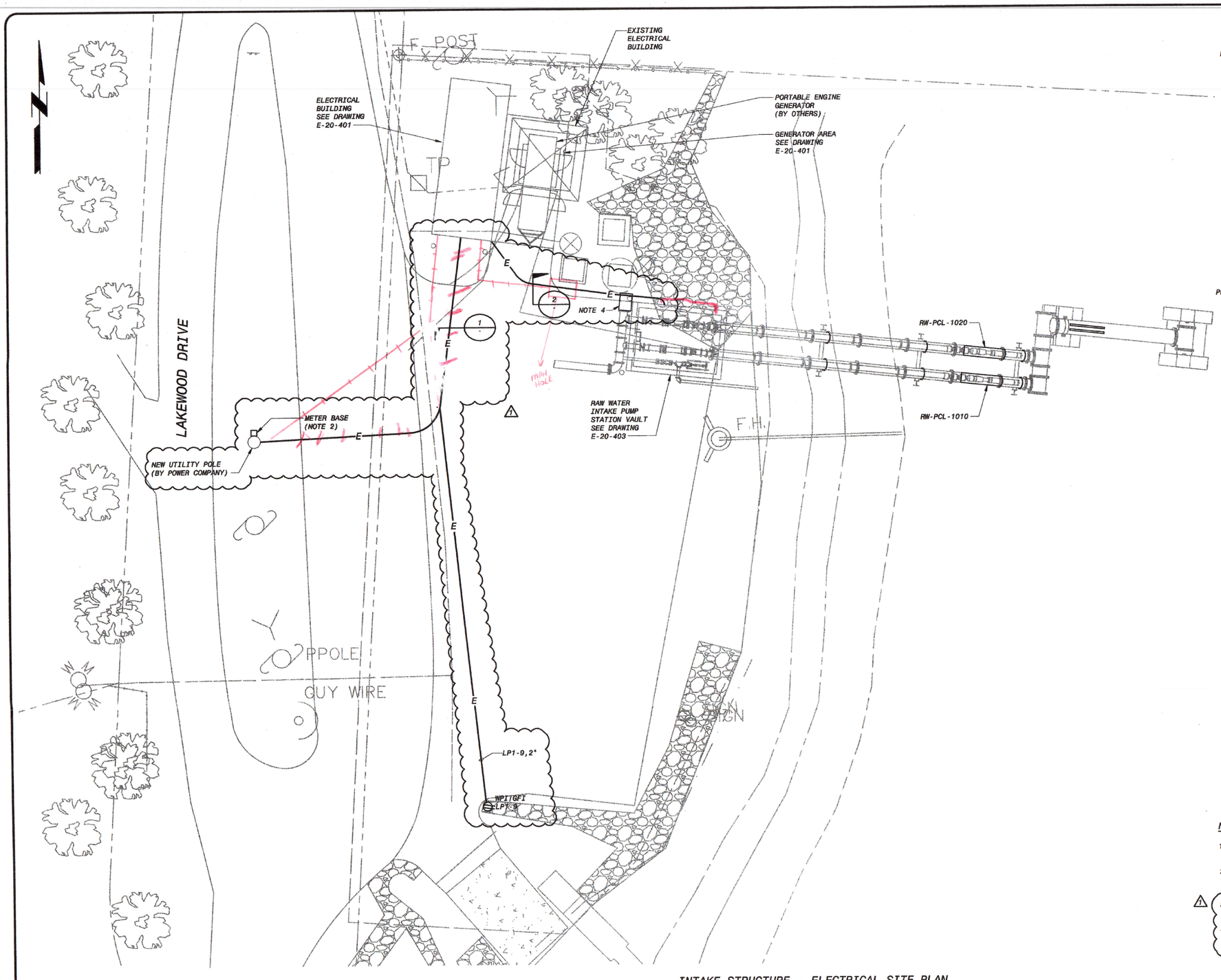
DESIGNED: ZKO
DETAILED: RTD
CHECKED:
APPROVED:
DATE:

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

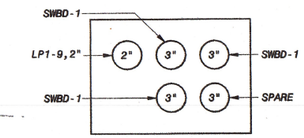
PROJECT NO. 182262

E-00-001
SHEET
OF

FD7000
D7000



INTAKE STRUCTURE - ELECTRICAL SITE PLAN
1" = 10'-0"



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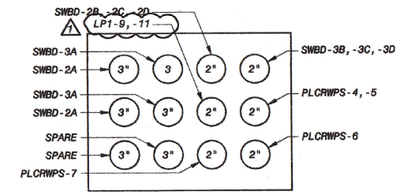

SECTION 2
NO SCALE
(NOTE 3)

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND AND ABBREVIATIONS & GENERAL REQUIREMENTS.
2. COORDINATE WITH POWER COMPANY TO DETERMINE LOCATION OF METER BASE. LOCATION SHOWN IS BASED ON TRANSFORMER MOUNTED CURRENT TRANSFORMERS.
3. CONTRACTOR SHALL FIELD COORDINATE DUCT BANK LOCATION TO AVOID EXISTING BURIED INFRASTRUCTURE.
4. IN ORDER TO AVOID CONFLICT WITH FUTURE PIPING THE TOP OF DUCT BACK WITHIN SPECIFIED BOUNDARY SHALL BE AT AN ELEVATION NO GREATER THAN 797.5'.

10' 0 10' 20'
1"=10'

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NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
1	ZKO	SDS		01/12/16	GENERAL REVISIONS
0	ZKO	SDS		12/04/15	ISSUED FOR CONSTRUCTION

50.3040 - Electrical Drawings
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PLOTTED:
USER: DRE60694
XREF1:
XREF2:
XREF3:
XREF4:
DWG VER: 1000

COMMONWEALTH OF VIRGINIA
SCOTT D. STOCKAM
LIC. NO. 0402-023079
1-13-2016
PROFESSIONAL ENGINEER

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BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
INTAKE STRUCTURE
SITE PLAN

DESIGNED: ZKO
DETAILED: DGP
CHECKED: SDS
APPROVED:
DATE: 01/12/16

0 1/2 1
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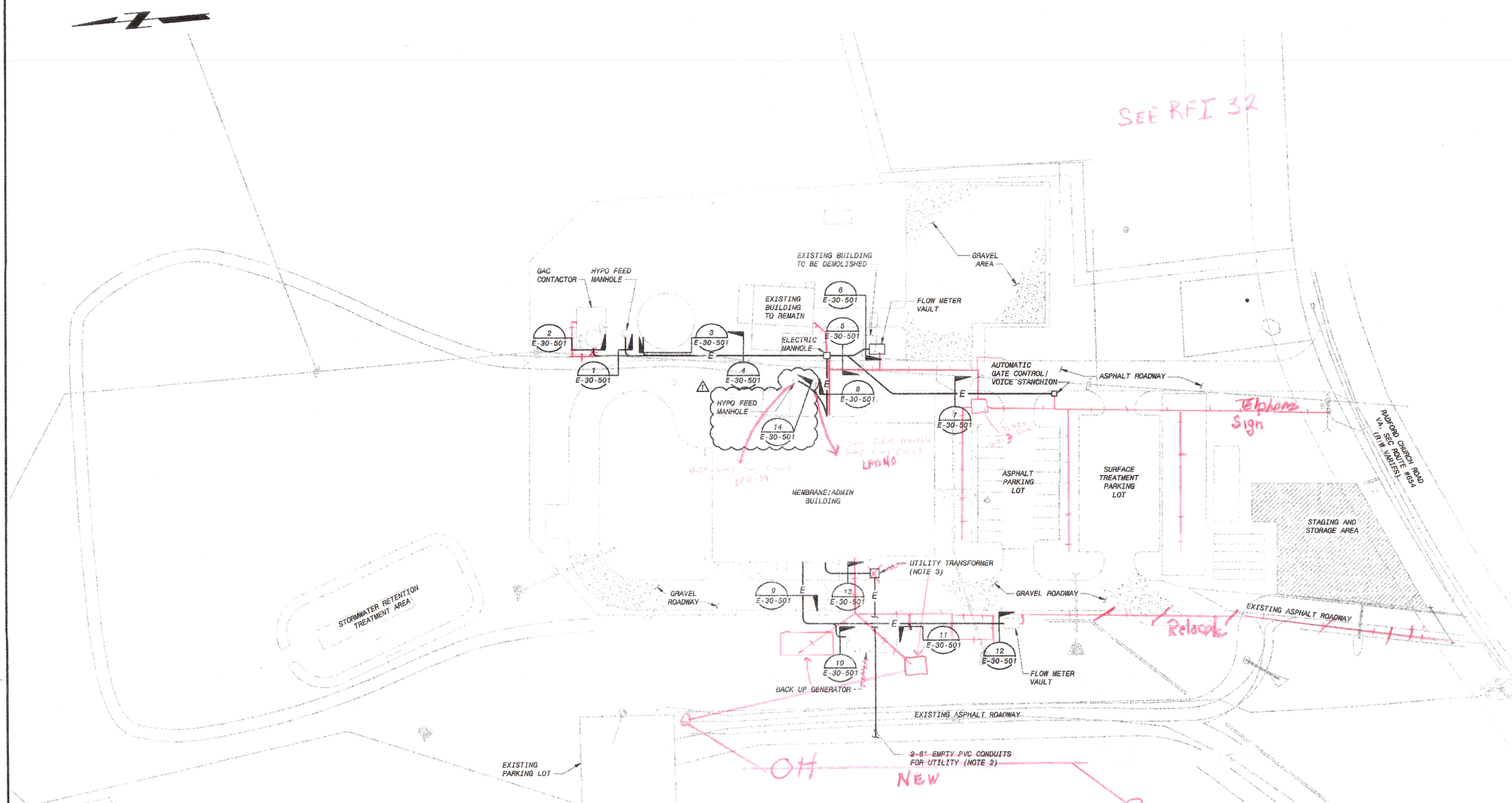
PROJECT NO.
189317

E-20-101
SHEET
OF

FD70000



MEMBRANE BUILDING - SITE PLAN

1" = 40'-0"

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. COORDINATE WITH POWER COMPANY REGARDING REQUIREMENTS FOR UTILITY SERVICE AND INSTALLATION.
3. UTILITY TRANSFORMER SHALL BE PER POWER COMPANY REQUIREMENTS.

40' 20' 0 40' 80'
1"=40'

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1	ZKO	SDS		01/11/16	GENERAL REVISIONS
0	ZKO	SDS		12/04/15	ISSUED FOR CONSTRUCTION

WO.3840 - Electrical Drawings

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XREF3: BORDER.dwg
XREF4: BORDER.dwg

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PLOTTED:
USER: DNE86894
DWG VER: 1000

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Lic. No. 0402-032019
1-13-2016
PROFESSIONAL ENGINEER

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ELECTRICAL
MEMBRANE BUILDING
SITE PLAN

DESIGNED: ZKO
DETAILED: DGP
CHECKED: SDS
APPROVED:
DATE: 01/11/16

0 1/2 1
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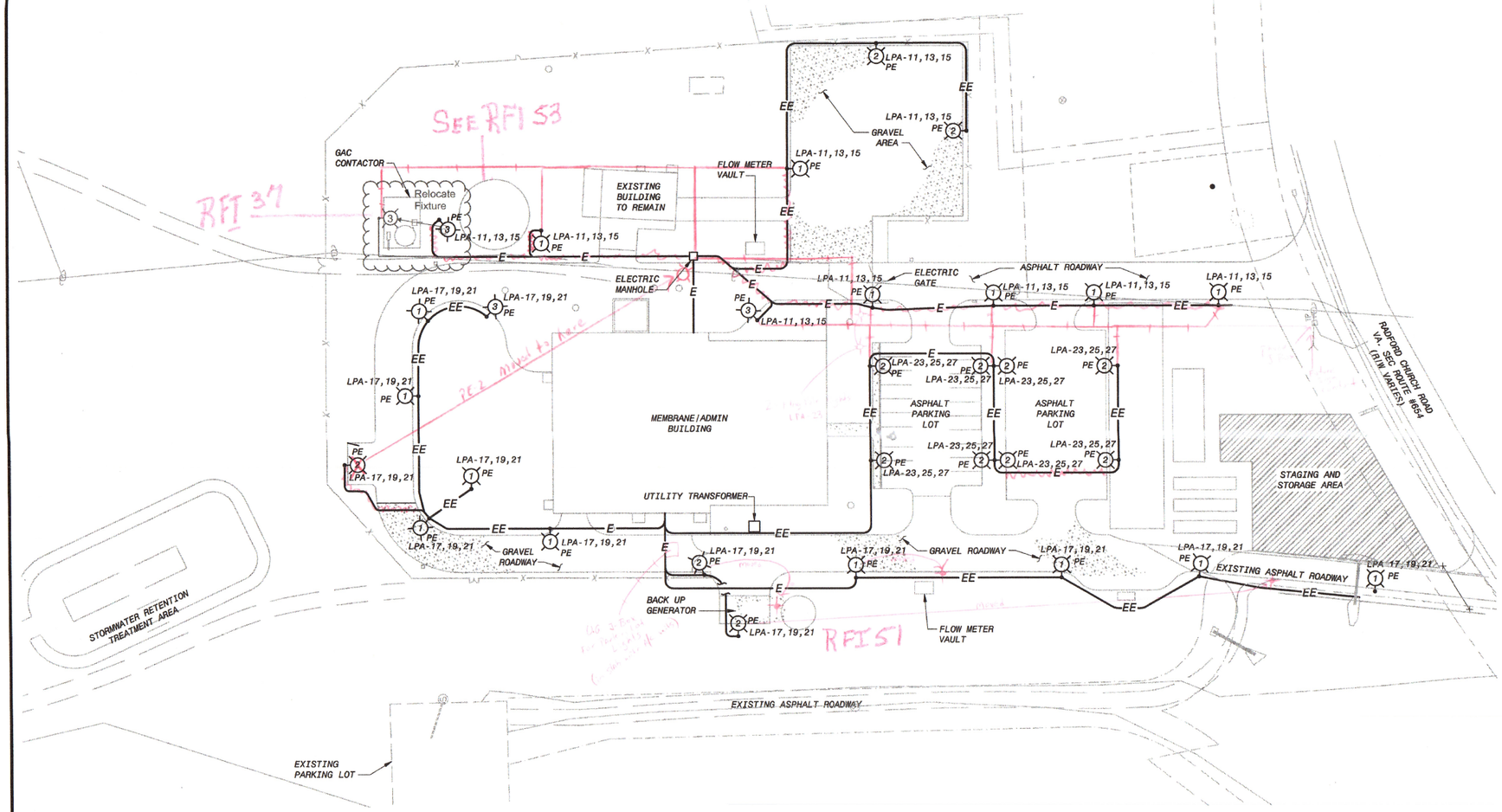
PROJECT NO.
189317

E-30-101
SHEET
OF

D0100 PM

APPROVED
By Tracy Connor at 4:29 pm, Mar 10, 2016



MEMBRANE BUILDING - SITE LIGHTING PLAN
1" = 40'-0"

NOTES:

1. SEE DRAWING E-1 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. THE MAXIMUM FOOTCANDLE READING AT THE PROPERTY LINE WILL NOT EXCEED 0.5 FOOTCANDLES.
3. ALL YARD LIGHTING FIXTURES WILL BE MOUNTED ON 18 FOOT HIGH POLES, LITHONIA MODEL SSS 4C DM19 DBL.

LIGHTING FIXTURE MODELS:

FIXTURE TYPE 1: LITHONIA# - KAD LED 40C 1000 40K R2 480
SPD 04 PER7 HS DBLXD DLL480F1.5 CUL JU

FIXTURE TYPE 2: LITHONIA# - KAD LED 40C 1000 40K R3 480
SPD 04 PER7 HS DBLXD DLL480F1.5 CUL JU

FIXTURE TYPE 3: LITHONIA# - KAD LED 40C 1000 40K R4 480
SPD 04 PER7 HS DBLXD DLL480F1.5 CUL JU

40' 20' 0 40' 80'
1"=40'

ISSUED FOR CONSTRUCTION

DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CK	APP
01/11/16	ISSUED FOR CONSTRUCTION	0	ZKO	SDS	

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XREF3:BORDER.dwg
XREF4:3D-M-30-MEMBRANE-B1.dwg
DWG VER: 1000

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MEMBRANE BUILDING
SITE LIGHTING PLAN

DESIGNED: ZKO
DETAILED: DAH
CHECKED: SDS
APPROVED:
DATE: 01/11/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
189317

E-30-102
SHEET
OF

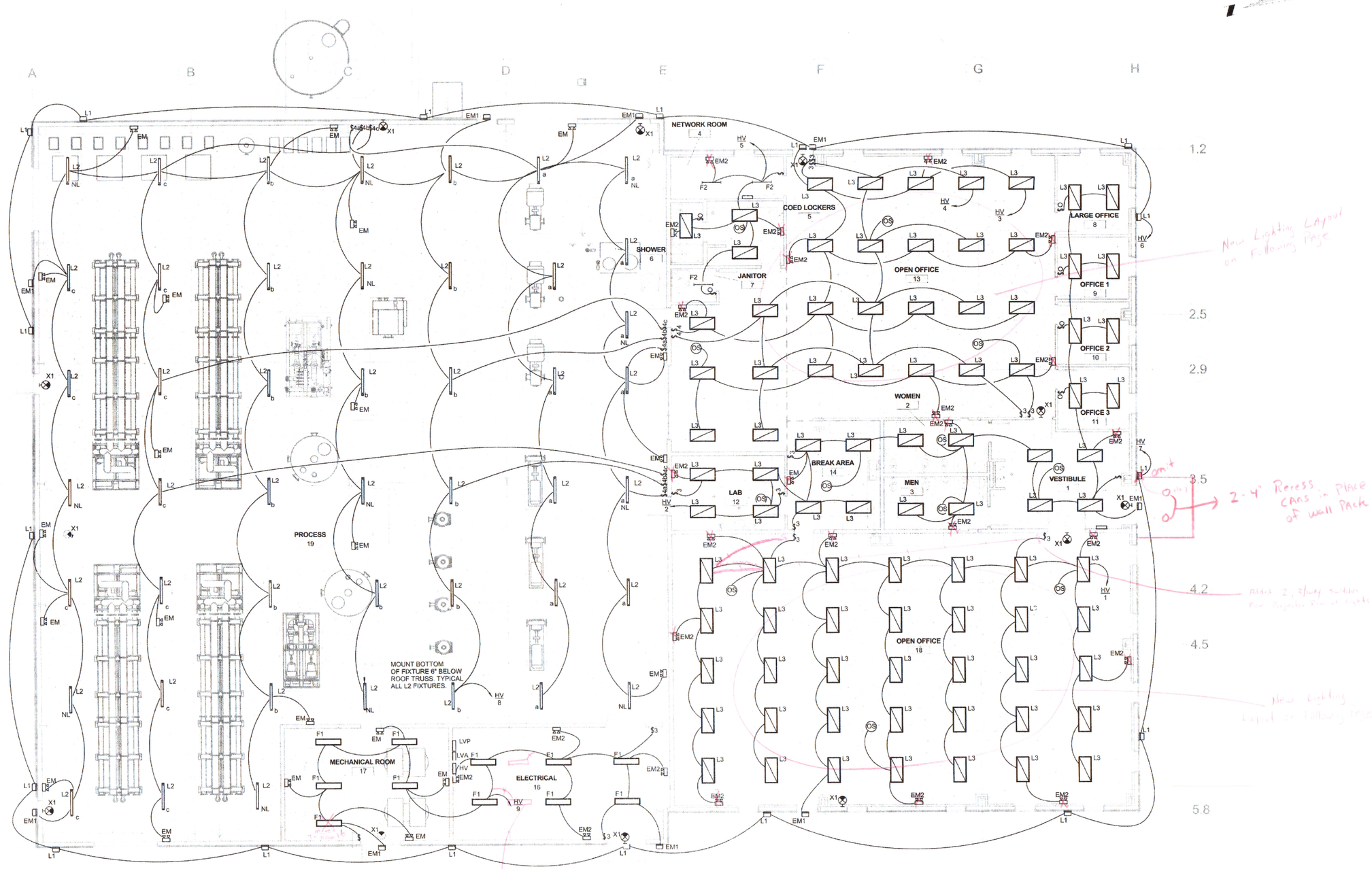
I37000_PW
D7000

Varney Received 02.08.16

GENERAL NOTES

1. CIRCUIT ALL EXIT SIGNS TO PANEL HV CIRCUIT 10 WITH 2#10,1#10G IN 3/4"C.

CHA
1901 Innovation Drive, Suite 2100
Blacksburg, VA 24060
Main: (518) 453-4500 www.chacompanies.com



1 LIGHTING PLAN - OPERATING FLOOR
1/8" = 1'-0"

ISSUED FOR CONSTRUCTION

NO.	BY	CHK	APP	DATE	REVISIONS AND RECORD OF ISSUE
0				01/06/16	ISSUED FOR CONSTRUCTION

PW: V:\Projects\BVA\27872\0400_REVIT\08 ELEC\27872-ELEC13-CENTRAL(IND).rvt
SN:
SAVED: 1/7/2016 9:45:31 AM
PLOTTED:
USER:
DWG VER: A

XREF1:
XREF2:
XREF3:
XREF4:

BLACK & VEATCH
Building a world of difference
Black & Veatch Corporation
Kansas City, Missouri

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
LAKES TO FOREST WATER LINE EXTENSION

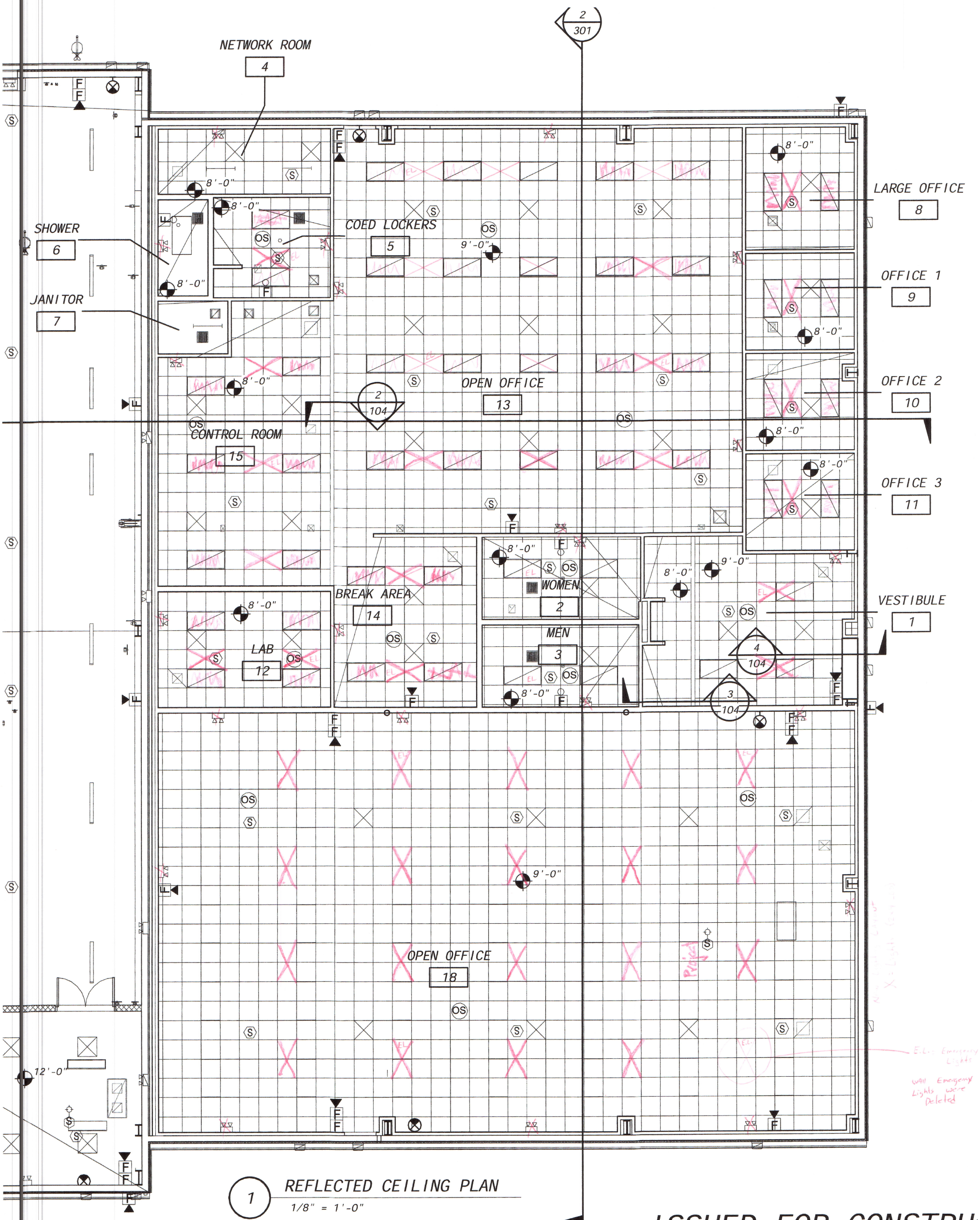
ELECTRICAL
MEMBRANE/ADMIN
LIGHTING PLAN

DESIGNED: MA
DETAILED: CJE
CHECKED: MLS
APPROVED: MLS
DATE: 8/14/15

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

CHA PROJECT NO.
27872

E-30-401
SHEET
OF



1 REFLECTED CEILING PLAN

1/8" = 1'-0"

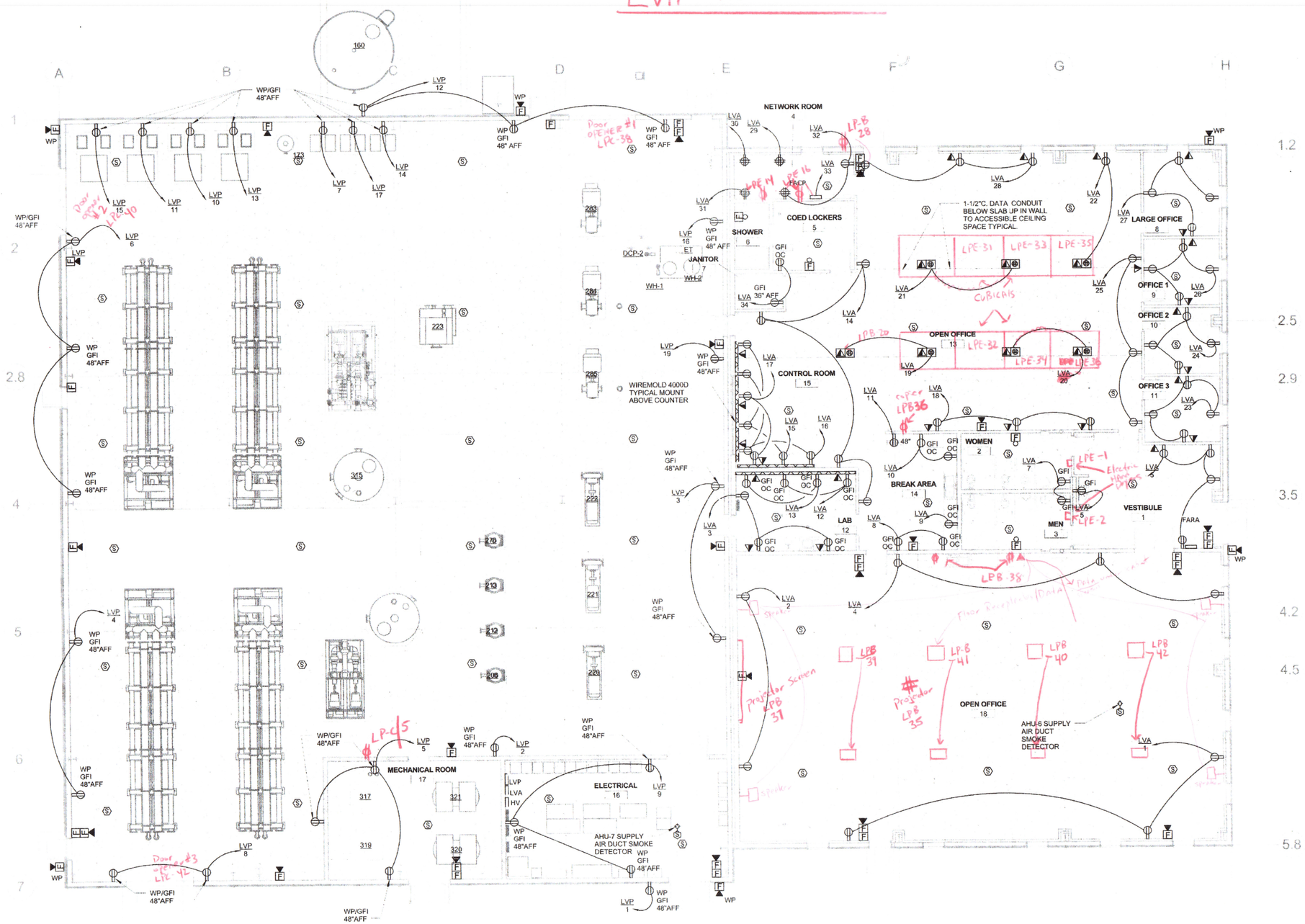
ISSUED FOR CONSTRU

4 5

Varney Received 02.08.16

"LVP = Now IS LP-C"

"LVA = Now IS LP-B"



1 POWER PLAN - OPERATING FLOOR
1/8" = 1'-0"

ISSUED FOR CONSTRUCTION

CHA
1901 Innovation Drive, Suite 2100
Blacksburg, VA 24060
Main: (518) 453-4500 www.chacompanies.com

NO.	BY	CHK	APP	DATE	REVISIONS AND RECORD OF ISSUE
0				01/06/16	ISSUED FOR CONSTRUCTION

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USER:
XREF1:
XREF2:
XREF3:
XREF4:
DWG VER: A

BLACK & VEATCH
Building a world of difference
Black & Veatch Corporation
Kansas City, Missouri

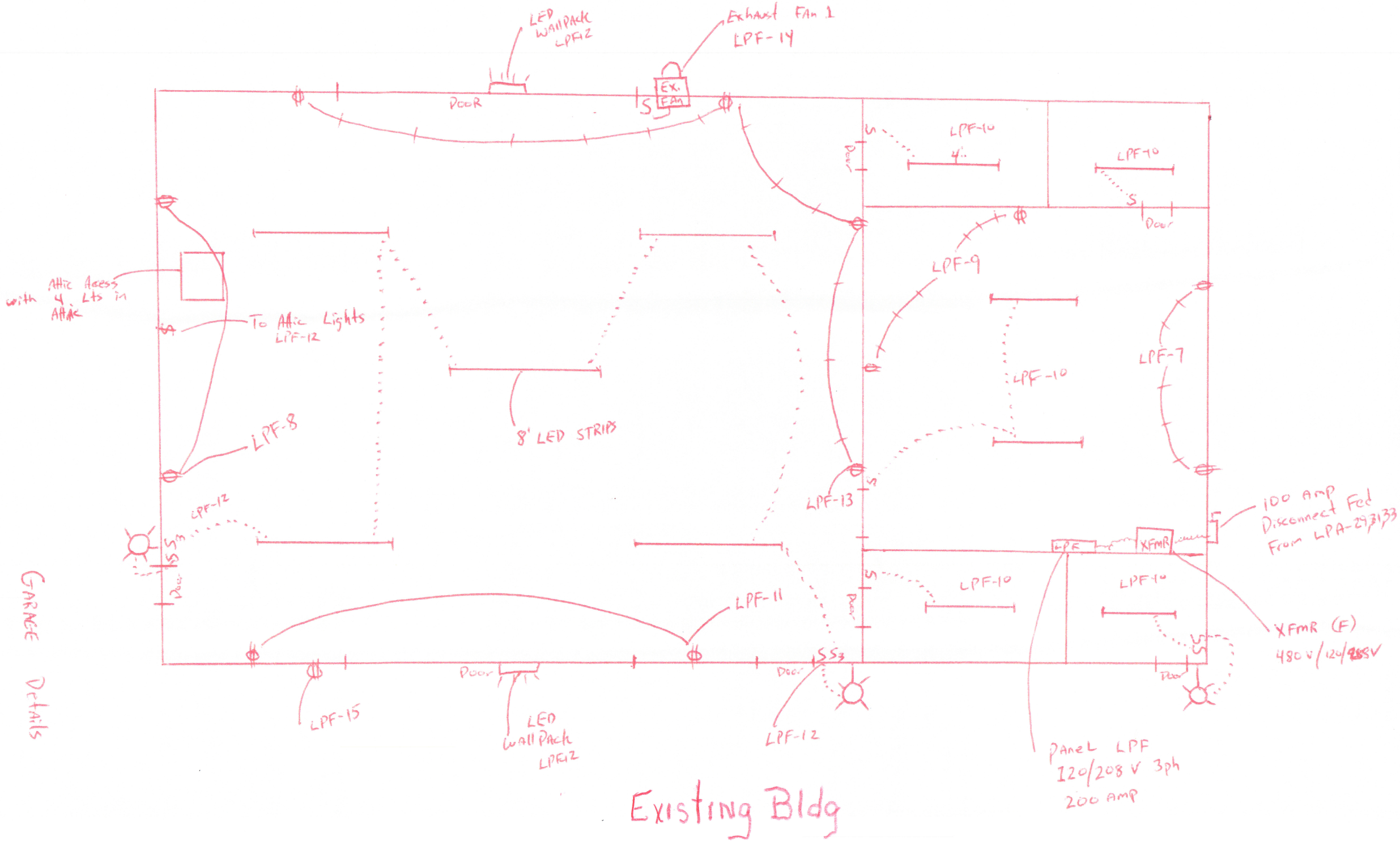
BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP & LAKES TO FOREST WATER LINE EXTENSION
ELECTRICAL
CONVENIENCE POWER AND SYSTEMS PLAN

DESIGNED: MA
DETAILED: CJE
CHECKED: MLS
APPROVED: MLS
DATE: 8/14/15

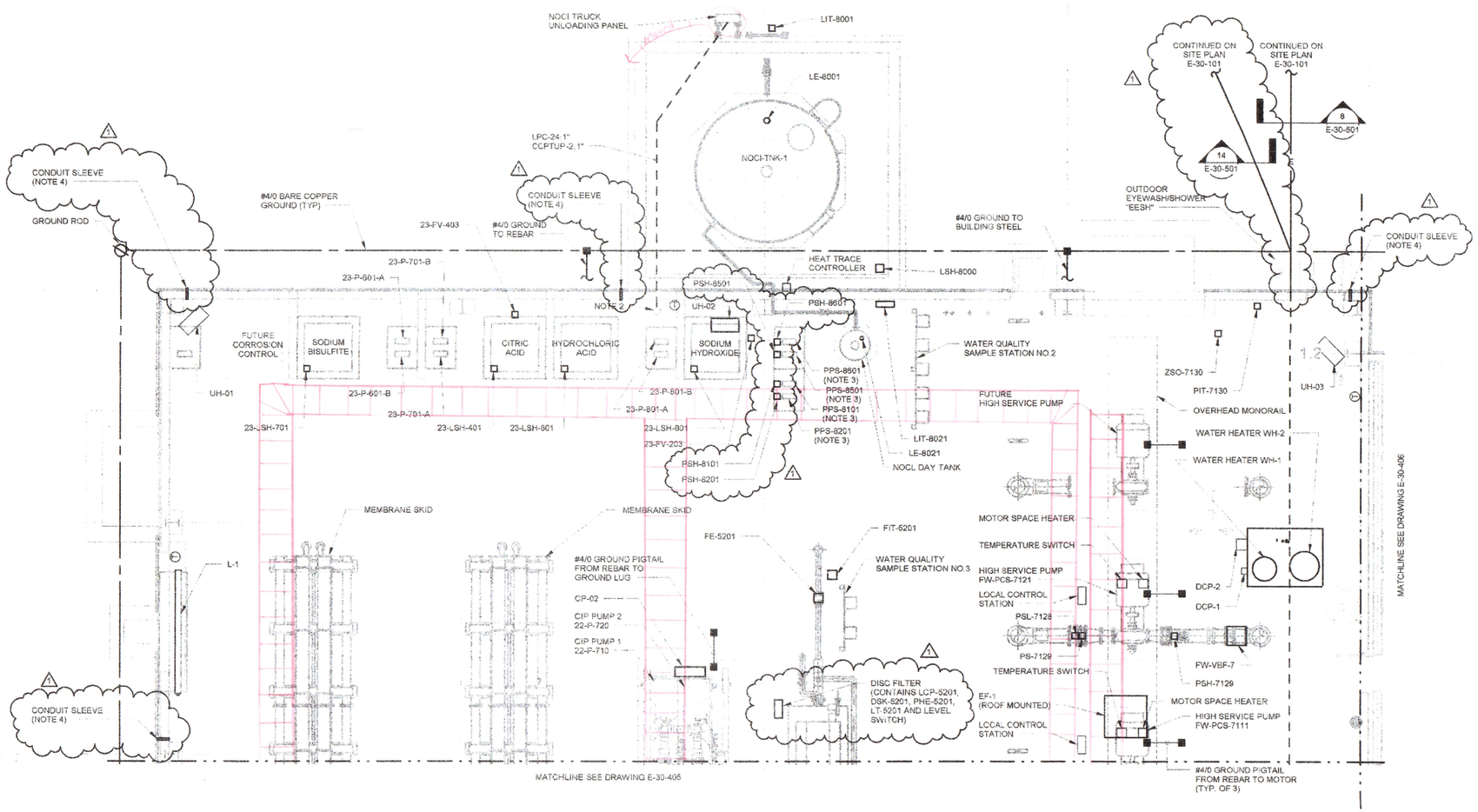
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

CHA PROJECT NO. 27872

E-30-402
SHEET
OF



GARAGE Details



CABLE TRAY
Continued

1 POWER PLAN - OPERATING FLOOR
3/16" = 1'-0"

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. STUB UP CONDUIT NEAR WALL.
3. FOR SODIUM HYPOCHLORITE METERING PUMPS ASSOCIATED LS IS LOCATED NEAR PUMP LOCATION.
4. CONTRACTOR SHALL INSTALL A MINIMUM 3/4" PVC CONDUIT SLEEVE FROM BUILDING INTERIOR TO EXTERIOR OF BUILDING A MINIMUM ONE FOOT BELOW GRADE FOR LIGHTNING PROTECTION DOWNLEAD. REFER TO LIGHNTING PROTECTION DESIGN SUBMITTAL FOR MORE DETAILS.

ISSUED FOR CONSTRUCTION

NO.	BY	CHK	APP	GENERAL REVISIONS
1	ZKO	SDS		ISSUED FOR CONSTRUCTION
0	ZKO	SDS		REVISIONS AND RECORD OF ISSUE

DATE: 01/11/16
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SAVED: 1/12/2016 10:08:13 AM
PLOTTED:
USER:
DWG VER: 1
XREF1:
XREF2:
XREF3:
XREF4:

LICENSED PROFESSIONAL ENGINEER
COMMONWEALTH OF VIRGINIA
LICENSE No. 0402-032079
1-13-2016

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Black & Veatch Corporation
Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
LAKES TO FOREST WATER LINE EXTENSION

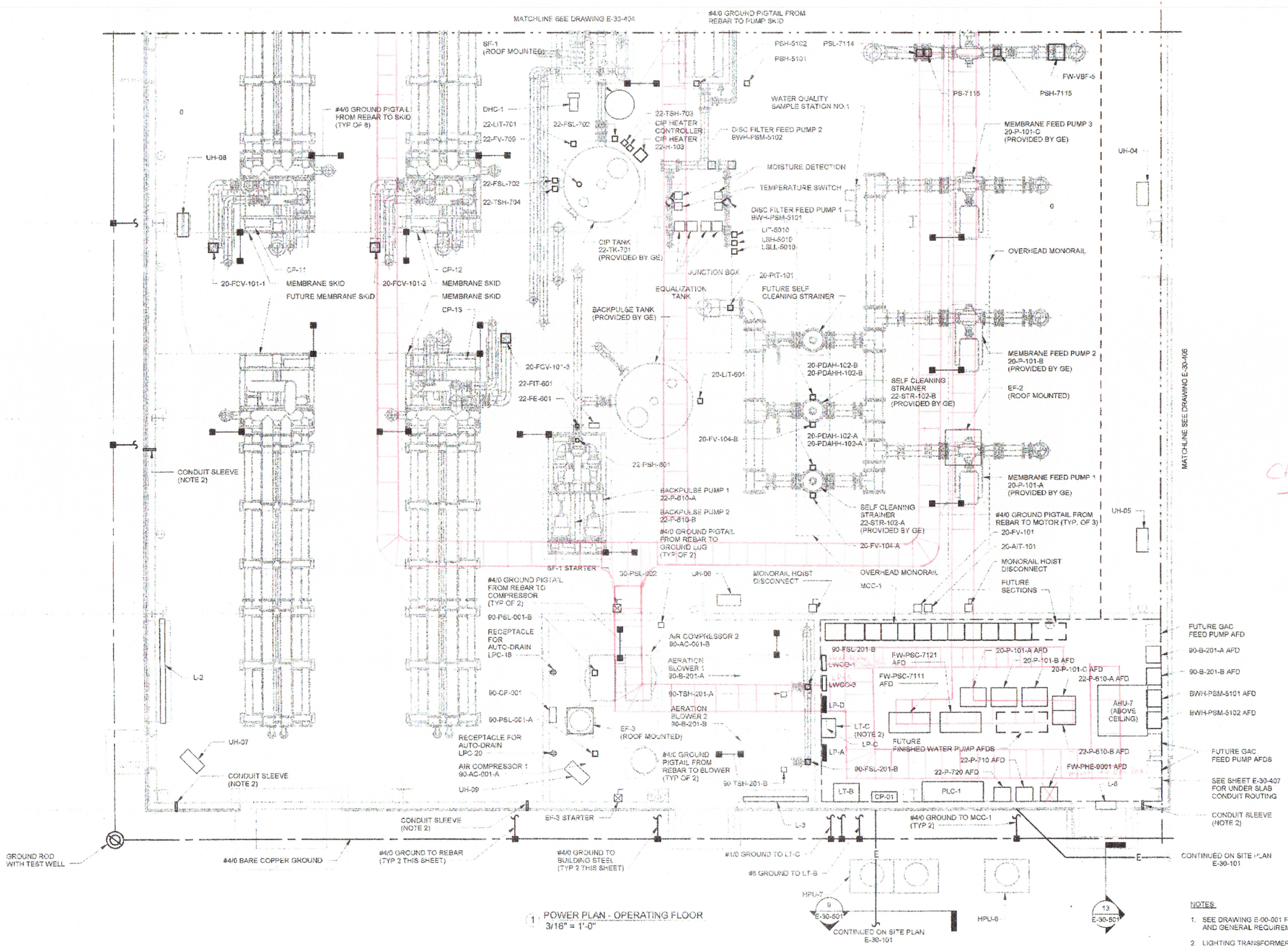
ELECTRICAL
MEMBRANE/ADMIN BUILDING
PARTIAL POWER PLAN

DESIGNED: ZKO
DETAILED: NTD
CHECKED: SDS
APPROVED:
DATE: 01/11/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 182262

E-30-404
SHEET
OF



1 POWER PLAN - OPERATING FLOOR
3/16" = 1'-0"

Cable Tray

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. LIGHTING TRANSFORMER "LT-C" SHALL BE WALL MOUNTED ABOVE LIGHTING PANEL "LP-C".
3. CONTRACTOR SHALL INSTALL A MINIMUM 3/4" PVC CONDUIT SLEEVE FROM BUILDING INTERIOR TO EXTERIOR OF BUILDING A MINIMUM ONE FOOT BELOW GRADE FOR LIGHTNING PROTECTION DOWNLEAD. REFER TO LIGHTNING PROTECTION DESIGN SUBMITTAL FOR MORE DETAILS.

ISSUED FOR CONSTRUCTION

NO.	BY	CHK	APP	REVISIONS AND RECORD OF ISSUE	DATE
0	ZKO	SDS		ISSUED FOR CONSTRUCTION	01/11/16

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XREF2:
XREF3:
XREF4:
SAVED: 1/11/2016 5:48:45 PM
PLOTTED:
USER:
DWG VER:

SCOTT D. STOCKAM
Lic. No. 0402-032079
1-13-2016
COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER

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Black & Veatch Corporation
Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
LAKES TO FOREST WATER LINE EXTENSION

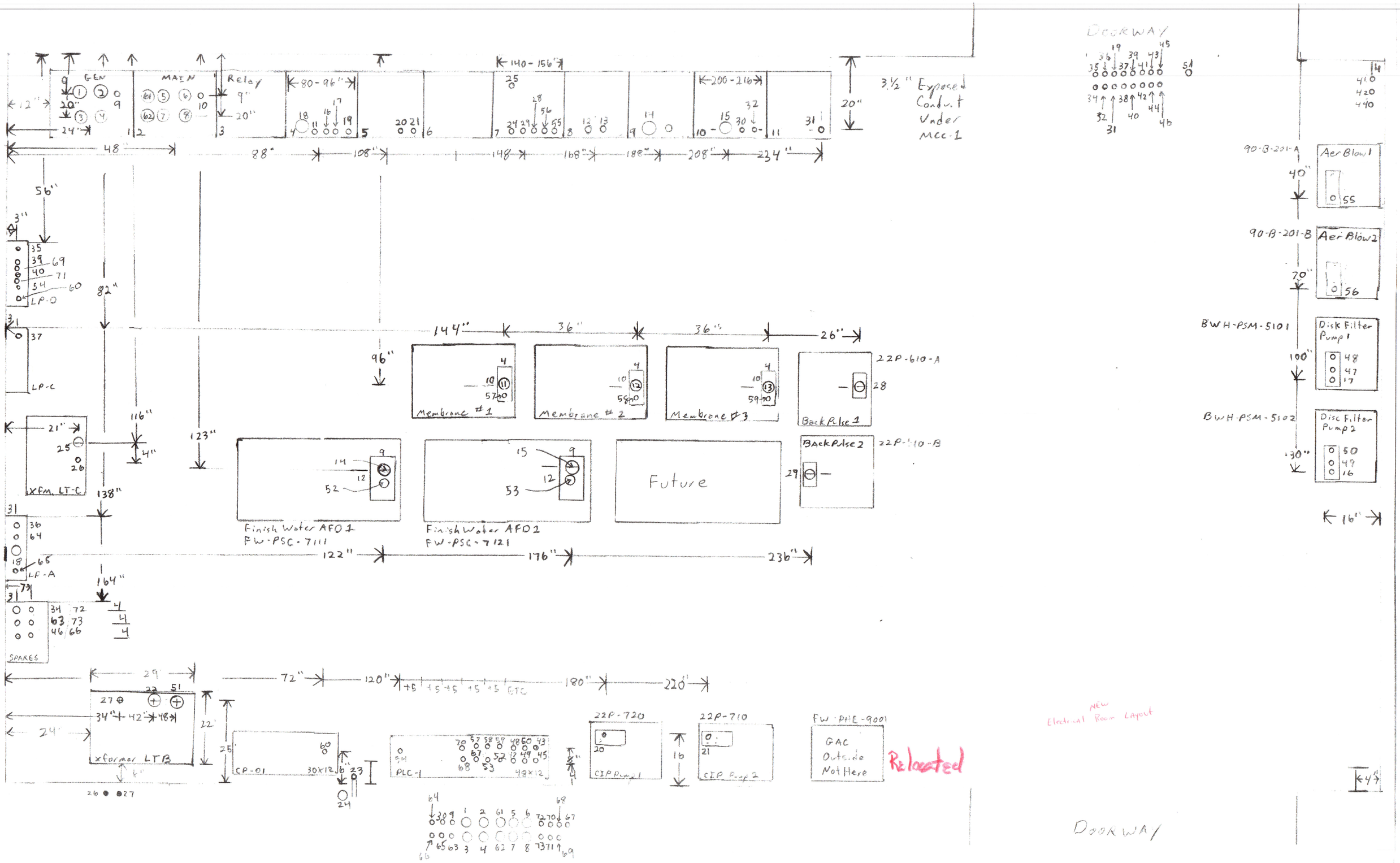
ELECTRICAL
MEMBRANE/ADMIN BUILDING
PARTIAL POWER PLAN

DESIGNED: ZKO
DETAILED: NTD
CHECKED: SDS
APPROVED:
DATE: 01/11/16

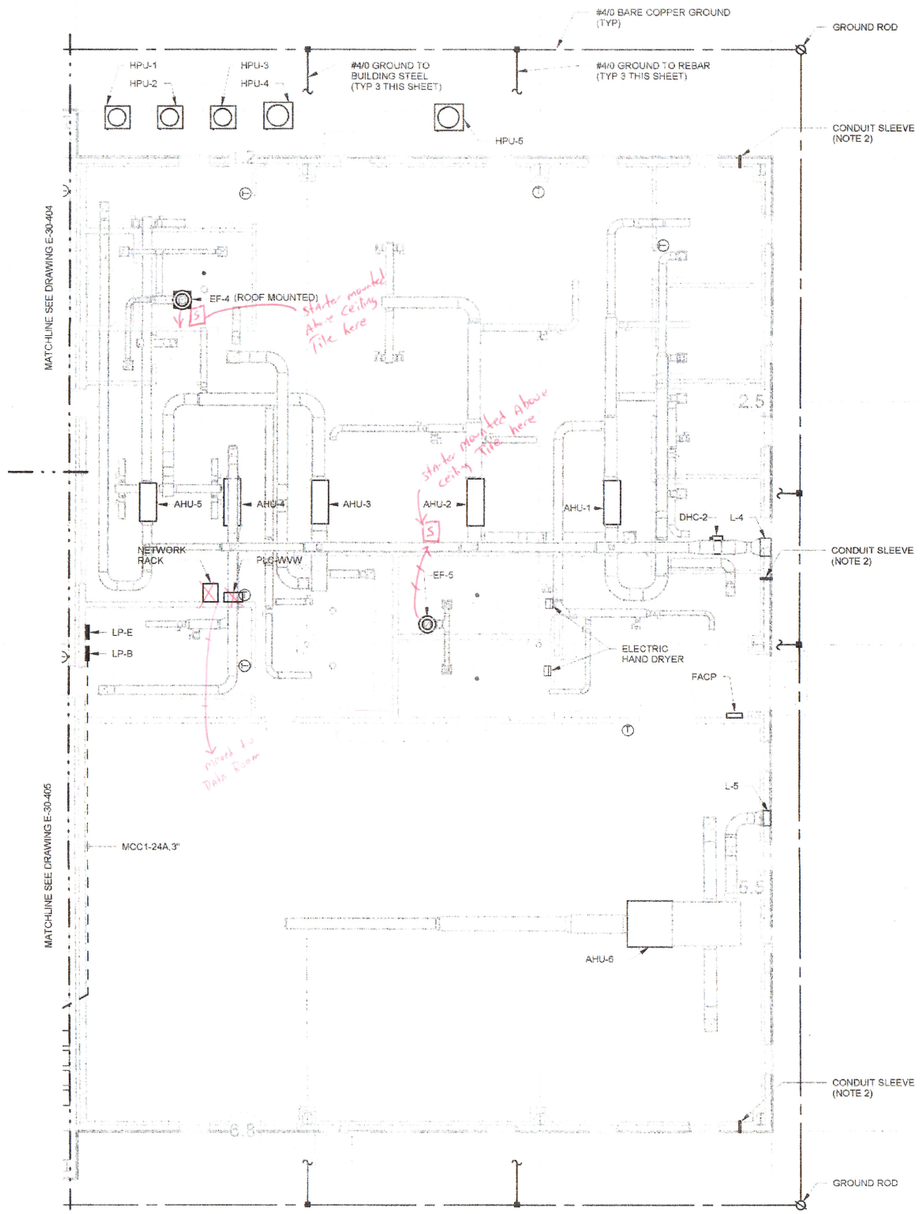
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 182262

E-30-405
SHEET
OF


GEN
MAIN
Relay
3½" Exposed Conduit Under MCC-1
DOORWAY
Aer Blow 1
Aer Blow 2
Disk Filter Pump 1
Disc Filter Pump 2
Membrane #1
Membrane #2
Membrane #3
Back Pulse 1
Back Pulse 2
Future
Finish Water AFD 1
FW-PSC-7111
Finish Water AFD 2
FW-PSC-7121
xfm. LT-C
LP-C
LP-D
LP-A
SPARES
xformer LTB
CP-01
PLC-1
CIP Pump 1
CIP Pump 2
GAC Outside Not Here
Relocated
NEW Electrical Room Layout
DOORWAY

Varney Received 02 08 16



1 POWER PLAN - OPERATING FLOOR
1/8" = 1'-0"

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. CONTRACTOR SHALL INSTALL A MINIMUM 3/4" PVC CONDUIT SLEEVE FROM BUILDING INTERIOR TO EXTERIOR OF BUILDING A MINIMUM ONE FOOT BELOW GRADE FOR LIGHTNING PROTECTION DOWNLEAD. REFER TO LIGHTNING PROTECTION SUBMITTAL FOR MORE DETAILS.

ISSUED FOR CONSTRUCTION

NO.	BY	CHK	APP	DATE	REVISIONS AND RECORD OF ISSUE
0	ZKO	SDS		01/11/16	ISSUED FOR CONSTRUCTION

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USER:
XREF1:
XREF2:
XREF3:
XREF4:
DWG VER:

COMMONWEALTH OF VIRGINIA
SCOTT D. STOCKTON
Lic. No. 0402-032079
1-13-2016
PROFESSIONAL ENGINEER

BLACK & VEATCH
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Black & Veatch Corporation
Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
LAKES TO FOREST WATER LINE EXTENSION

ELECTRICAL
MEMBRANE/ADMIN BUILDING
PARTIAL POWER PLAN

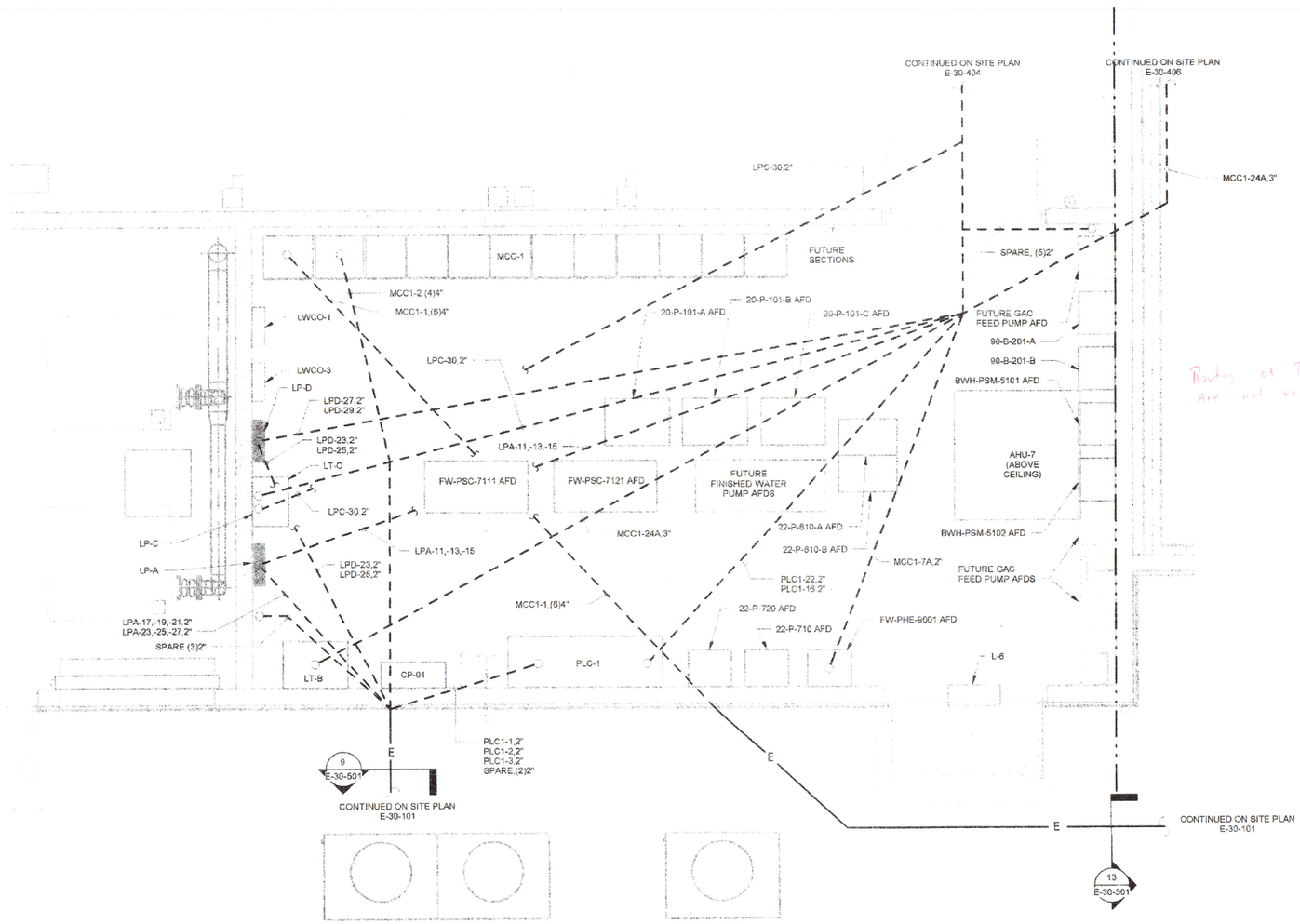
DESIGNED: ZKO
DETAILED: PTD
CHECKED: SDS
APPROVED:
DATE: 01/11/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
182262

E-30-406
SHEET
OF

D/000



Routing of these conduits shown are not exactly as shown.

1 ENLARGED UNDER SLAB POWER PLAN - OPERATING FLOOR
3/8" = 1'-0"

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS

ISSUED FOR CONSTRUCTION

NO.	BY	CHK	APP	DATE	REVISIONS AND RECORD OF ISSUE
0	ZKO	SDS		01/11/16	ISSUED FOR CONSTRUCTION

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PLOTTED:
USER:
XREF1:
XREF2:
XREF3:
XREF4:
DWG VER:

COMMONWEALTH OF VIRGINIA
SCOTT D. SPOSKUP
LIC. NO. 0402-022013
1-12-2016
PROFESSIONAL ENGINEER

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Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
LAKES TO FOREST WATER LINE EXTENSION

ELECTRICAL
MEMBRANE/ADMIN BUILDING
UNDER SLAB CONDUIT ROUTING POWER PLAN

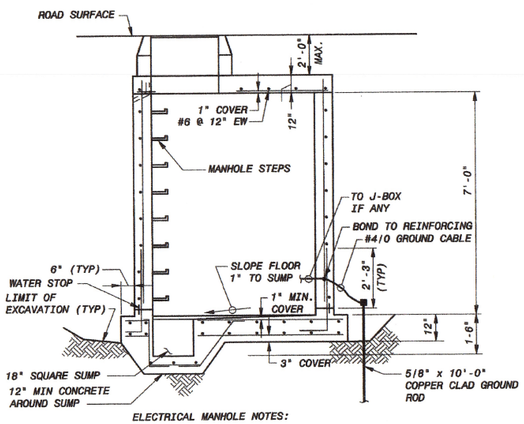
DESIGNED: ZKO
DETAILED: RTD
CHECKED: SDS
APPROVED:
DATE: 01/11/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
182262

E-30-407
SHEET
OF

27600

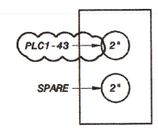


ELECTRICAL MANHOLE NOTES:

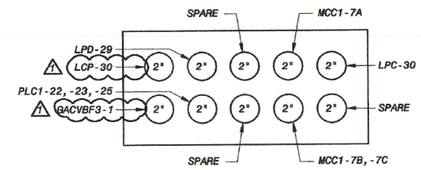
1. CABLE AND CONDUIT SUPPORTS SHALL BE SPACED AT 2'-0" HORIZONTAL CENTERS IN WALLS AND SHALL BEGIN 2'-0" FROM FLOOR.
2. SUPPORTS IN CEILINGS SHALL RUN FROM WALL TO WALL.
3. OPENING SHALL BE PROVIDED IN MANHOLE WALLS FOR CONDUIT BANK ENTRANCE AS REQUIRED.
4. ALL REINFORCING ON THIS DETAIL SHALL BE #6@12" UNLESS NOTED OTHERWISE. CENTER VERTICAL REINFORCING IN THE WALLS.
5. CONCRETE TO BE ROUGH AND CLEAN AT CONSTRUCTION JOINT FACES.

TRAFFIC RATED ELECTRICAL MANHOLE SECTION (--)

NO SCALE SUITABLE FOR ROADWAY LOCATIONS



SECTION (1) E-30-101
NO SCALE



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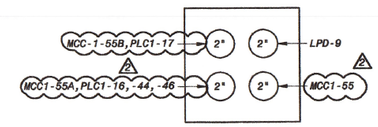

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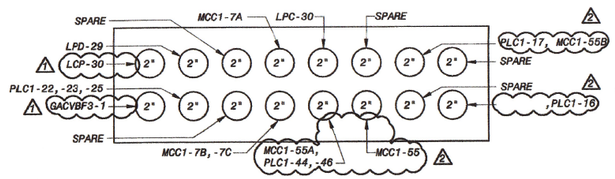

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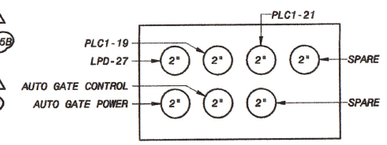

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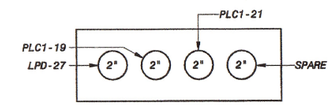

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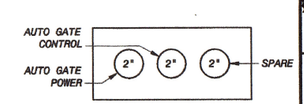

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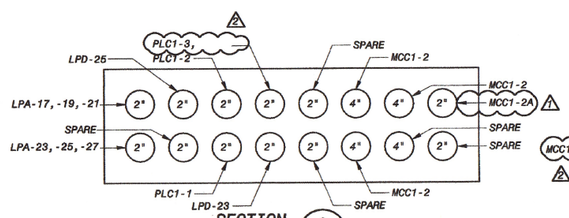
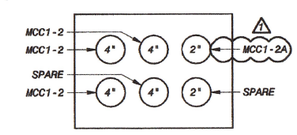


SECTION (9) E-30-101
NO SCALE

SECTION (8) E-30-101
NO SCALE



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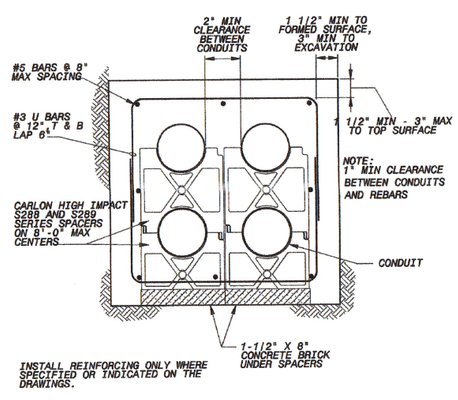
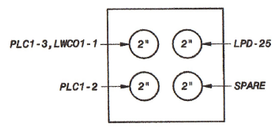


INSTALL REINFORCING ONLY WHERE SPECIFIED OR INDICATED ON THE DRAWINGS.

TYPICAL DUCT BANK SECTION

NO SCALE



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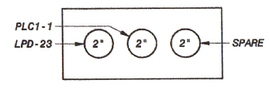

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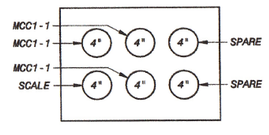

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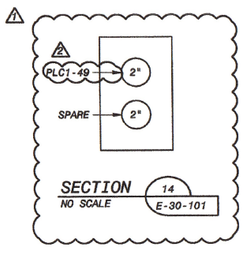


SECTION (14) E-30-101
NO SCALE

NOTES:

1. SEE DRAWING E-1 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

ISSUED FOR CONSTRUCTION

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
2	ZKO	SDS		07/18/16	ECN-013
1	ZKO	SDS		01/11/16	GENERAL REVISIONS
0	ZKO	SDS		11/04/15	ISSUED FOR CONSTRUCTION

XREF1: BORDER.dwg
XREF2:
XREF3:
XREF4:
No. 3040 - Electrical Drawings
SAVED: DNE69694, 7/18/2016 11:03:14 AM
PLOTTED:
USER: DNE69694
DWG VER: 1000

COMMONWEALTH OF VIRGINIA — SCOTT W. STOCKAN — Lic. No. 0402-032079 — 7-18-2016 — PROFESSIONAL ENGINEER

BLACK & VEATCH
Building a world of difference.
Black & Veatch Corporation
Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP & RAW WATER PUMPING STATION / INTAKE

ELECTRICAL DETAILS

DESIGNED: ZKO
DETAILED: DAH
CHECKED: SDS
APPROVED:
DATE: 07/18/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 189317

E-30-501
SHEET OF

F07000_PW
D7000

PANELBOARD: LP-A
SERVICE: 277/480V, 3PH, 4W, S/N
MOUNTING: SURFACE
BUS: COPPER
RATING: 100A
MAINS: 3P-100A MAIN BREAKER
LOCATION: ELECTRICAL ROOM

PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.	LOAD	P	BKR	CKT #		BKR	P	LOAD	PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.
										LTG. - ROOM			
1120			LTG. - OPEN OFFICE 18	1	20	1	2	20	1	1,2,3,8,9,10,11,12,14	768		
	480		LTG. - OPEN OFFICE 13	1	20	3	4	20	1	LTG. - OPEN OFFICE 13		352	
		270	LTG. - ROOM 4,5,6,7	1	20	5	6	20	1	LTG. - EXTERIOR NORTH			504
720			LTG. - EXTERIOR SOUTH	1	20	7	8	20	1	LTG. - PROCESS AREA	2254		
	648		LTG. - ROOM 16,17	1	20	9	10	20	1	LTG. - EXITS		2	
			SITE LIGHTING - EAST SIDE	3	20	11	12	20	1	SPARE Outside Lights/Motorwell			
			--	-	-	13	14	20	1	SPARE			
			--	-	-	15	16	20	1	SPARE			
			SITE LIGHTING - WEST SIDE	3	20	17	18	20	3	SPARE			
			--	-	-	19	20	-	-	--			
			--	-	-	21	22	-	-	--			
			PARKING LOT LIGHTING	3		23	24	20	3	SPARE			
			--	-		25	26	-	-	--			
			--	-		27	28	-	-	--			
			SPARE	3		29	30		1	SPACE			
			--	-		31	32		1	SPACE			
			--	-		33	34		1	SPACE			
			SPACE	1		35	36		1	SPACE			
			SPACE	1		37	38		1	SPACE			
			SPACE	1		39	40		1	SPACE			
			SPACE	1		41	42		1	SPACE			
1840			TOTAL "A"			4862				TOTAL "A"	3022		
	1128		TOTAL "B"			1482				TOTAL "B"		354	
		270	TOTAL "C"			774				TOTAL "C"			504
			TOTAL =			7118							

PANELBOARD: LP-B
SERVICE: 120/208V, 3PH, 4W, S/N
MOUNTING: SURFACE
BUS: COPPER
RATING: 100A
MAINS: 3P-100A MAIN BREAKER
LOCATION: CONTROL ROOM

PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.	LOAD	P	BKR	CKT #		BKR	P	LOAD	PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.
540			RECPT - OPEN OFFICE 18	1	20	1	2	20	1	RECPT - OPEN OFFICE 18	360		
	540		RECPT - LAB 12	1	20	3	4	20	1	RECPT - OPEN OFFICE 19		540	
		180	RECPT - ELECTRIC WATER COOLER	1	20	5	6	20	1	RECPT - VESTIBULE 1			720
360			RECPT - MENS 3 & WOMENS 2	1	20	7	8	20	1	RECPT - BREAK AREA 14	360		
	180		RECPT - BREAK AREA 14	1	20	9	10	20	1	RECPT - BREAK AREA 14		360	
		180	RECPT - BREAK ARE FRIDGE	1	20	11	12	20	1	RECPT - LAB 12			360
360			RECPT - LAB 12	1	20	13	14	20	1	RECPT - OPEN OFFICE 13	720		
	540		RECPT - CONTROL ROOM 15	1	20	15	16	20	1	RECPT - CONTROL ROOM 15		540	
		360	RECPT - CONTROL ROOM 15	1	20	17	18	20	1	RECPT - OPEN OFFICE 13			540
800			RECPT - OPEN OFFICE 13 FLOOR	1	20	19	20	20	1	RECPT - OPEN OFFICE 13 FLOOR	800		
	800		RECPT - OPEN OFFICE 13 FLOOR	1	20	21	22	20	1	RECPT - OPEN OFFICE 13 FLOOR		580	
		720	RECPT - OFFICE 3 (ROOM 11)	1	20	23	24	20	1	RECPT - OFFICE 2 (ROOM 10)			720
540			RECPT - OPEN OFFICE 13	1	20	25	26	20	1	RECPT - OFFICE 1 (ROOM 9)	720		
	720		RECPT - LARGE OFFICE 8	1	20	27	28	20	1	RECPT - OPEN OFFICE 13		540	
		360	RECPT - NETWORK ROOM 4	1	20	29	30	20	1	RECPT - NETWORK ROOM 4			360
360			RECPT - NETWORK ROOM 4	1	20	31	32	20	1	RECPT - NETWORK ROOM 4	540		
	1200		FACP PANEL	1	20	33	34	20	1	RECP		360	
			SPARE Projector	1	20	35	36	20	1	SPARE Office Room 13			
			SPARE Projector Screen	1	20	37	38	20	1	SPARE Room 13 Counter			
			SPACE OFFICE 18 Floor Box	1	20	39	40	20	1	SPARE OFFICE 18 Floor Box			
			SPACE OFFICE 18 Floor Box	1	20	41	42	20	1	SPARE OPEN OFFICE Floor Box			
2960			TOTAL "A"			6460				TOTAL "A"	3500		
	3980		TOTAL "B"			6900				TOTAL "B"		2920	
		1800	TOTAL "C"			4500				TOTAL "C"			2700
			TOTAL =			17860							

PANELBOARD: LP-C
SERVICE: 120/208V, 3PH, 4W, S/N
MOUNTING: SURFACE
BUS: COPPER
RATING: 225A
MAINS: 3P-150A MAIN BREAKER
LOCATION: ELECTRICAL ROOM

PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.	LOAD	P	BKR	CKT #		BKR	P	LOAD	PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.
180			RECPT - ROOM 16 EXTERIOR	1	20	1	2	20	1	RECPT - PROCESS AREA	180		
	360		RECPT - PROCESS AREA	1	20	3	4	20	1	RECPT - PROCESS AREA		360	
		540	RECPT - ROOM 17	1	20	5	6	20	1	RECPT - PROCESS AREA			540
180			RECPT - PROCESS AREA	1	20	7	8	20	1	RECPT - PROCESS AREA	360		
	540		RECPT - ROOM 16	1	20	9	10	20	1	RECPT - PROCESS AREA		180	
		180	RECPT - PROCESS AREA	1	20	11	12	20	1	RECPT - PROCESS AREA			540
180			RECPT - PROCESS AREA	1	20	13	14	20	1	RECPT - PROCESS AREA	180		
	180		RECPT - PROCESS AREA	1	20	15	16	20	1	RECPT - PROCESS AREA		180	
		180	RECPT - PROCESS AREA	1	20	17	18	20	1	RECPT - AUTO-DRAIN			100
180			RECPT - PROCESS AREA	1	20	19	20	20	1	RECPT - AUTO-DRAIN	100		
	50		LIT-8021	1	20	21	22	20	1	SPARE		0	
		100	LWCO-1	1	20	23	24	20	1	TRUCK UNLOADING PANEL			100
0			SPARE	1	20	25	26	20	1	LWCO-3	100		
	1656		EF-3 STARTER	1	20	27	28	20	1	NOCL HEAT TRACE CONTROLLERQ		1000	
		1656	EF-4 STARTER	1	20	29	30	100	3	LP-D			4300
1 500			GAC-VBF-3	1	20	31	32	-	-	---	4300		
			SPARE	1	20	33	34	-	-	---		4300	
			SPARE	1	20	35	36	20	1	SPARE Circulation Pump #2			
			SPARE Heat Trace GAC	1	20	37	38	20	1	SPARE Door OPENER #1			
			SPACE Heat Trace Raw Water	1	20	39	40	20	1	SPARE Door OPENER #2			
			SPACE Heat Trace Fact Water	1	20	41	42	20	1	SPARE Door OPENER #3			
1220			TOTAL "A"			6440				TOTAL "A"	5220		
	2786		TOTAL "B"			8806				TOTAL "B"		6020	
		2656	TOTAL "C"			8236				TOTAL "C"			5580
			TOTAL =			23482							

PANELBOARD: LP-D
SERVICE: 120/208V, 3PH, 4W, S/N
MOUNTING: SURFACE
BUS: COPPER
RATING: 225A
MAINS: 3P-150A MAIN BREAKER
LOCATION: ELECTRICAL ROOM

PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.	LOAD	P	BKR	CKT #		BKR	P	LOAD	PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.
500			PLC-1	1	20	1	2	20	1	NOCL-PPS-8101	500		
	500		NOCL-PPS-8201	1	20	3	4	20	1	NOCL-PPS-8501		500	
		500	NOCL-PPS-8601	1	20	5	6	20	1	SPARE			
500			CP-02	1	20	7	8	20	1	SPARE			
	50		LIT-7002 VBF-7 Valve	1	20	9	10	20	1	pH/CHLORINE ANALYZER		100	
		250	23-P-801-A	1	20	11	12	20	1	23-P-801-B			250
250			23-P-601-A	1	20	13	14	20	1	23-P-601-B	250		
	250		23-P-701-A	1	20	15	16	20	1	23-P-701-B		250	
		1700	90-DR-001-A	1	20	17	18	20	1	90-DR-001-B			1700
500			DCP-1	1	20	19	20	20	1	DCP-2	500		
	500		OUTDOOR EYEWASH/SHOWER	1	20	21	22	20	1	CP-11		500	
		100	FIT-3001	1	20	23	24	20	1	CP-12			500
100			LIT-3001	1	20	25	26	20	1	CP-13	500		
	100		FIT-7131	1	20	27	28	20	1	CP-01		500	
		100	FIT-9005	1	20	29	30	20	1	WATER QUALITY STATION 1			250
100			FIT-5201	1	20	31	32	20	1	WATER QUALITY STATION 2	250		
	100		22-FIT-601	1	20	33	34	20	1	WATER QUALITY STATION 3		250	
			SPARE LIT 5010	1	20	35	36	20	1	SPARE Gas Remote I/O Panel			
			SPARE SPARE Pump	1	20	37	38	20	1	SPARE Sodium Remote I/O Panel			
			SPACE	1	20	39	40	20	1	SPARE Auto GATE			
			SPACE	1	20	41	42	20	1	SPARE			
1950			TOTAL "A"			3950				TOTAL "A"	2000		
	1500		TOTAL "B"			3600				TOTAL "B"		2100	
		2650	TOTAL "C"			5350				TOTAL "C"			2700
			TOTAL =			12900							

PANELBOARD: LP-E
SERVICE: 120/208V, 3PH, 4W, S/N
MOUNTING: SURFACE
BUS: COPPER
RATING: 400A
MAINS: 3P-350A MAIN BREAKER
LOCATION: CONTROL ROOM

PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.	LOAD	P	BKR	CKT #		BKR	P	LOAD	PHASE "A" V.A.	PHASE "B" V.A.	PHASE "C" V.A.
1000			ELECTRIC HAND DRYER	1	20	1	2	20	1	ELECTRIC HAND DRYER	1000		
	500		EF-4	1	20	3	4	20	1	EF-5		500	
		7280	AHU-1	2	70	5	6	80	2	AHU-2			7800
7280			--	-	-	7	8	-	-	--	7800		
	7600		AHU-3	2	80	9	10	40	2	AHU-4		4000	
		7600	--	-	-	11	12	-	-	--			4000
4000			AHU-5	2	40	13	14	20	1	NETWORK RACK	500		
	4000		--	-	-	15	16	20	1	PLC-WWW		500	
		2800	HPU-1	2	40	17	18	60	2	HPU-2			3750
2800			--	-	-	19	20	-	-	--	3750		
	3120		HPU-3	2	50	21	22	20	2	HPU-4		1040	
		3120	--	-	-	23	24	20	-	--			1040
1250			HPU-5	2	20	25	26	100	3	LIGHTING PANEL LP-B	6460		
	1250		--	-	20	27	28	-	-	--		6900	
			SPARE	1	20	29	30	-	-	--			4500
			SPARE	1	20	31	32	20	1	SPARE			
			SPARE Room 13 Cubicals	1	20	33	34	20	1	SPARE Room 13 Cubicals			
			SPARE	1	20	35	36	20	1	SPARE			
			SPARE	1	20	37	38	20	1	SPARE			
			SPACE	1	20	39	40	20	1	SPARE			
			SPACE	1	20	41	42	20	1	SPARE			
16330			TOTAL "A"			35840				TOTAL "A"	19510		
	16470		TOTAL "B"			29410				TOTAL "B"		12940	
		20800	TOTAL "C"			41890				TOTAL "C"			21090
			TOTAL =			107140							

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

ISSUED FOR CONSTRUCTION

NO.	BY	CK	APP	REVISIONS AND RECORD OF ISSUE
1	ZKO	SDS		GENERAL REVISIONS
0	ZKO	SDS		ISSUED FOR CONSTRUCTION

DATE 01/11/16 12/04/15

XREF1:LP-D.xls
XREF2:LP-E.xls
XREF3:LP-A.xls
XREF4:LP-B.xls

DWG VER: 1000

DATE: 12/22/2015 10:13:49 AM

SCOTT D. SPONCKAM Lic. No. 0402-010279 PROFESSIONAL ENGINEER COMMONWEALTH OF VIRGINIA 1-15-2016

BLACK & VEATCH Building a world of difference.

Black & Veatch Corporation
Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
POWER & LIGHTING PANEL SCHEDULES

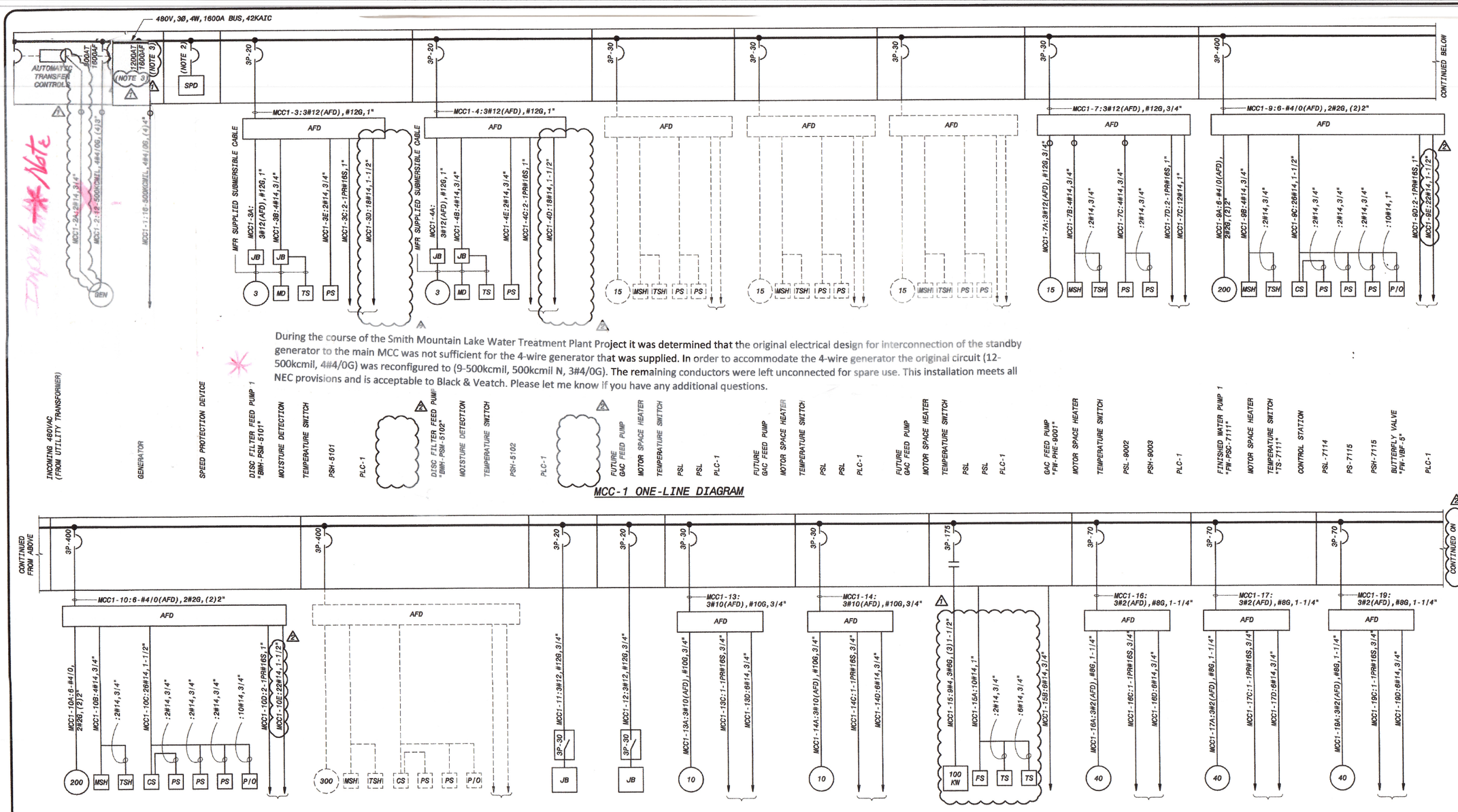
DESIGNED: ZKO
DETAILED: DGP
CHECKED: SDS
APPROVED:
DATE: 01/11/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 189317

E-30-502
SHEET
OF

FG7000 PW
07000



During the course of the Smith Mountain Lake Water Treatment Plant Project it was determined that the original electrical design for interconnection of the standby generator to the main MCC was not sufficient for the 4-wire generator that was supplied. In order to accommodate the 4-wire generator the original circuit (12-500kcmil, 4#4/0G) was reconfigured to (9-500kcmil, 500kcmil N, 3#4/0G). The remaining conductors were left unconnected for spare use. This installation meets all NEC provisions and is acceptable to Black & Veatch. Please let me know if you have any additional questions.

MCC-1 ONE-LINE DIAGRAM

MCC-1 ONE-LINE DIAGRAM

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. SPD BREAKER SHALL BE SIZED BY EQUIPMENT MANUFACTURER.
3. CONDUCT FACTORY AND ON-SITE TESTING OF GROUND FAULT FUNCTIONALITY OF BREAKER.

ISSUED FOR CONSTRUCTION

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
2	ZKO	SDS		07/18/16	ECN-013
1	ZKO	SDS		01/11/16	GENERAL REVISIONS
0	ZKO	SDS		12/04/15	ISSUED FOR CONSTRUCTION

JOB NO. 3040 - Electrical Drawings
SAVED: DREG0684, 7/18/2016 11:07:59 AM
PLOTTED: HAR16086, 6/12/2014 11:53:
USER: DREG0684 DWG VER: 1000
XREF1: BORDER.dwg
XREF2:
XREF3:
XREF4:

SCOTT D. STOCKAM, Lic. No. 0402-032079, Professional Engineer, Commonwealth of Virginia

BLACK & VEATCH, Building a world of difference.
Black & Veatch Corporation, Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP & RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
MCC-1 ONE-LINE DIAGRAM

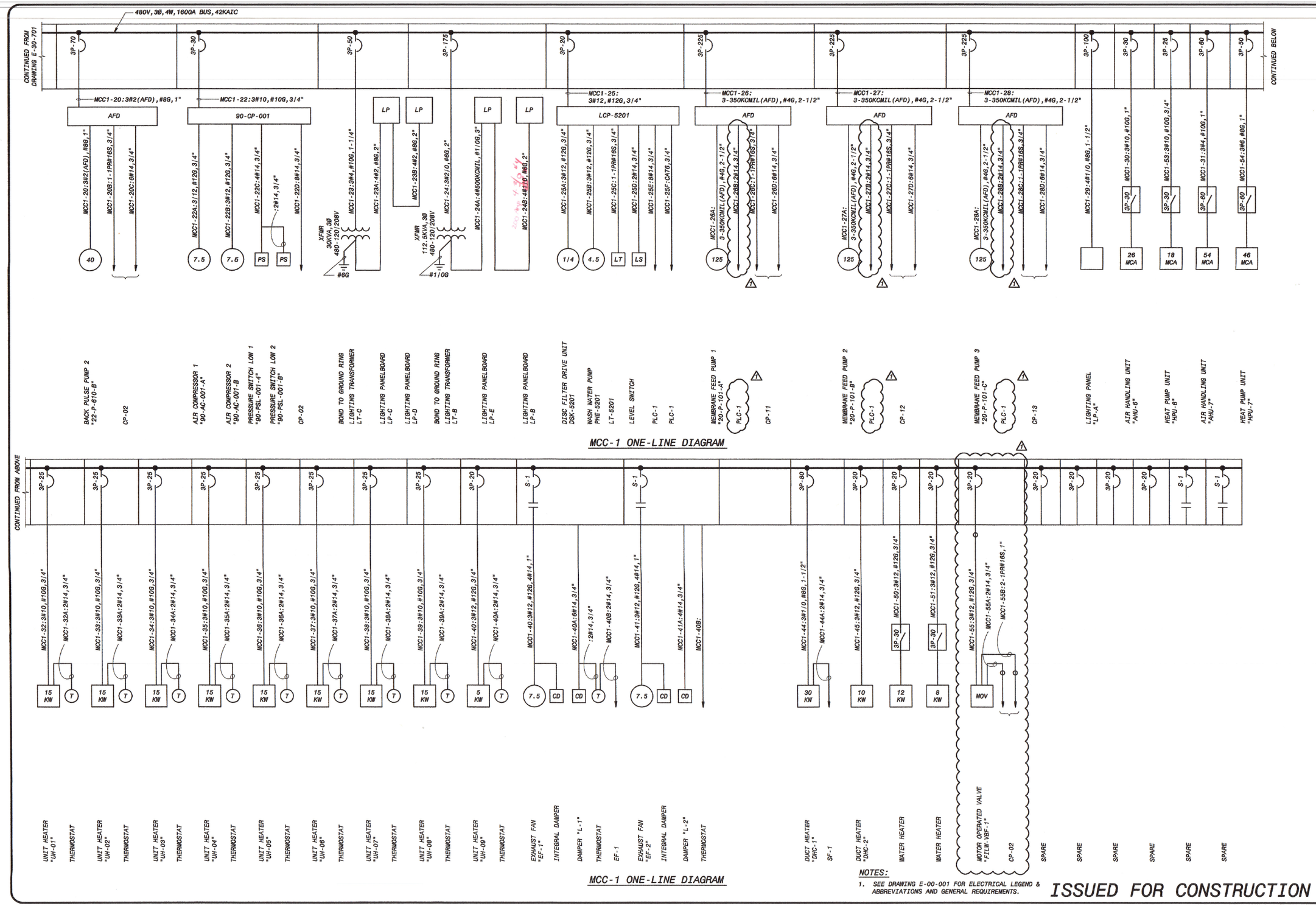
DESIGNED: ZKO
DETAILED: DAH
CHECKED: SDS
APPROVED:
DATE: 07/18/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 189317

E-30-701
SHEET OF

F07000_PM
07000



NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

ISSUED FOR CONSTRUCTION

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
1	ZKO	SGS		07/18/16	ECN-013
0	ZKO	SGS		01/11/16	ISSUED FOR CONSTRUCTION

PLOTTED: HAM18598, 6/12/2014 11:53:
USER: DNE60664 | DWG VER: 1000

XREF1: BORDER.dwg
XREF2:
XREF3:
XREF4:

COMMONWEALTH OF VIRGINIA — ROCKY D. COOKSON — LIC. NO. 0402-032079 — PROFESSIONAL ENGINEER — 7-18-2016

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Black & Veatch Corporation
Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP & RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
MCC-1 ONE-LINE DIAGRAM

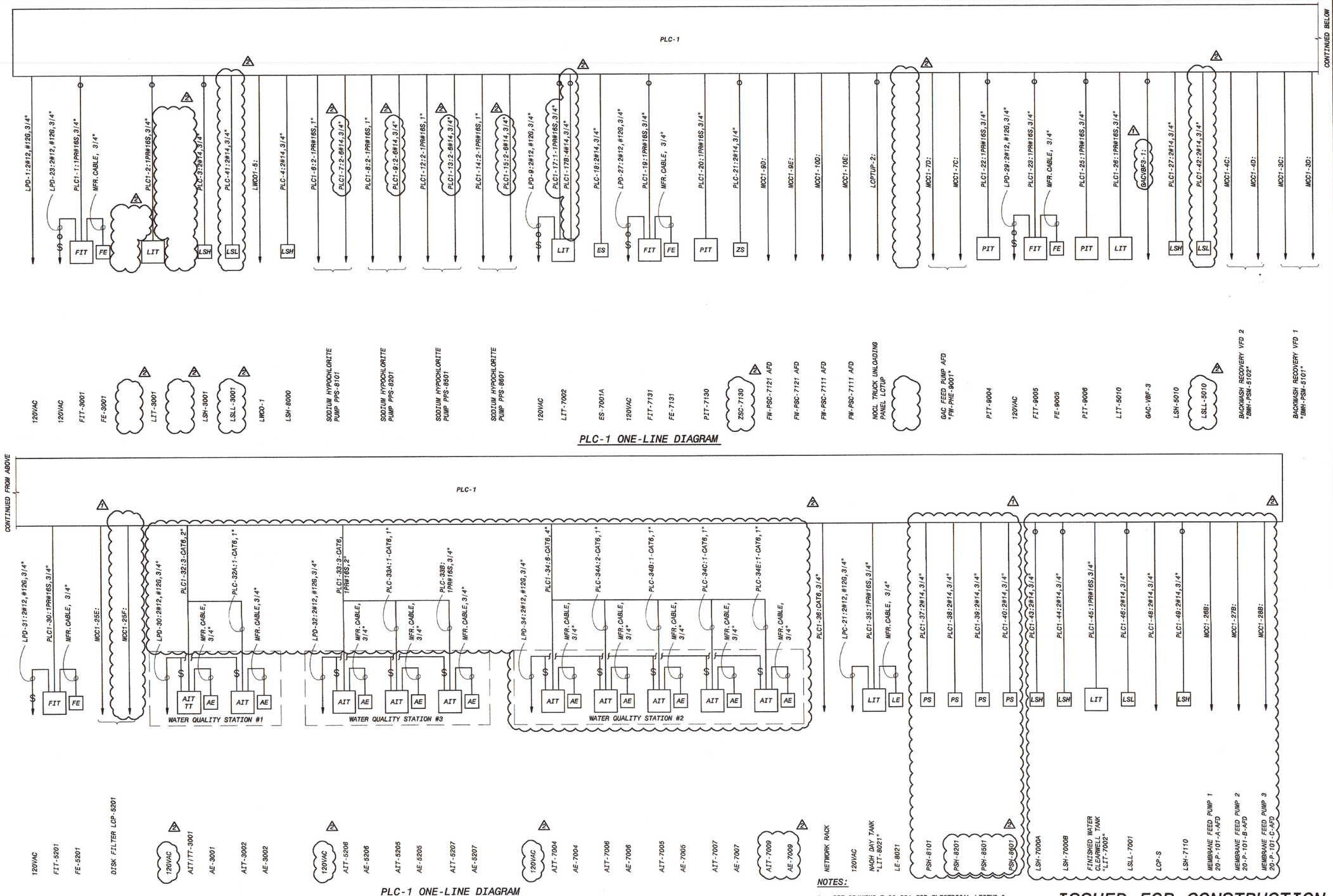
DESIGNED: ZKO
DETAILED: JES
CHECKED: SGS
APPROVED:
DATE: 07/18/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 189317

E-30-702
SHEET OF

F07000_PW
D7000



NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

ISSUED FOR CONSTRUCTION

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
2	ZKO	SDS		07/18/16	ECN-013
1	ZKO	SDS		07/11/16	GENERAL REVISIONS
0	ZKO	SDS		12/04/15	ISSUED FOR CONSTRUCTION

SCOTT D. STOCKAMP
Lic. No. 0402-032079
7-18-2016
COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER

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Black & Veatch Corporation
Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
PLC-1 ONE-LINE DIAGRAM

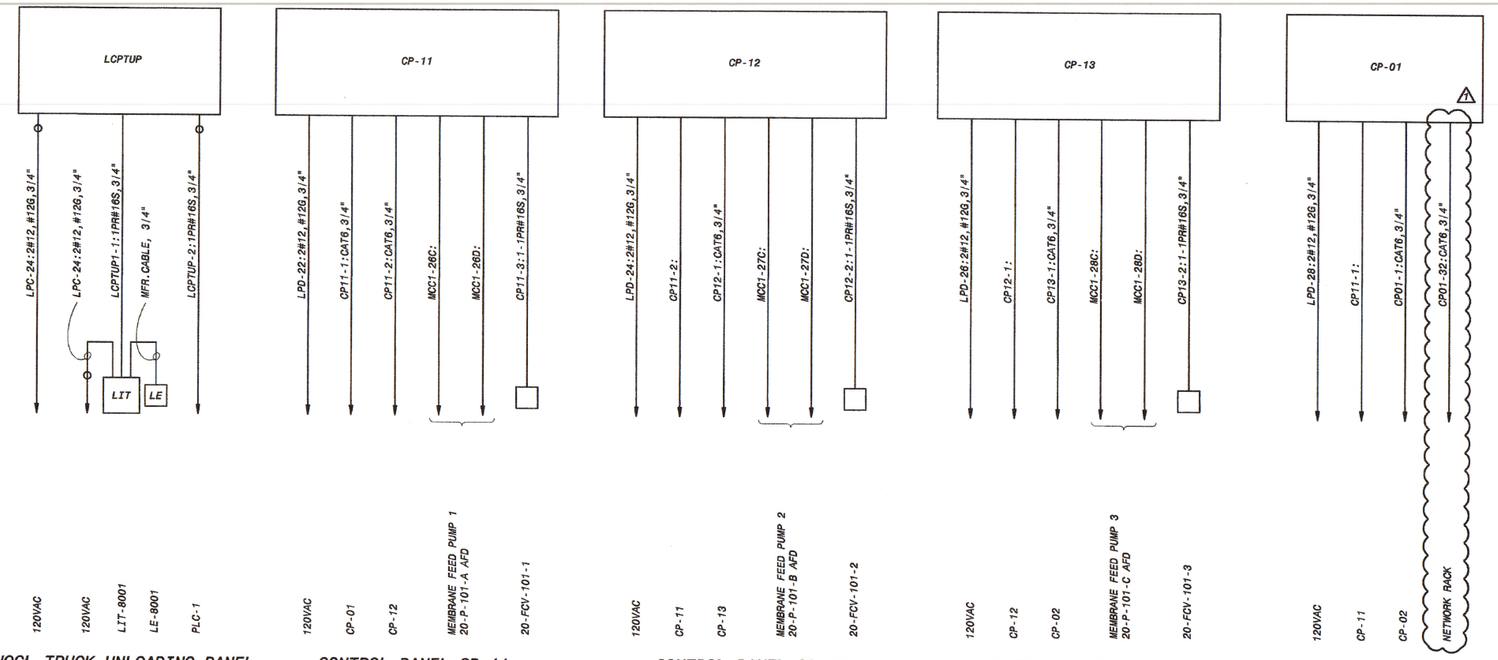
DESIGNED: ZKO
DETAILED: JES
CHECKED: SDS
APPROVED:
DATE: 07/18/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 189317

E-30-703
SHEET
OF

FD7000_PW
D7000



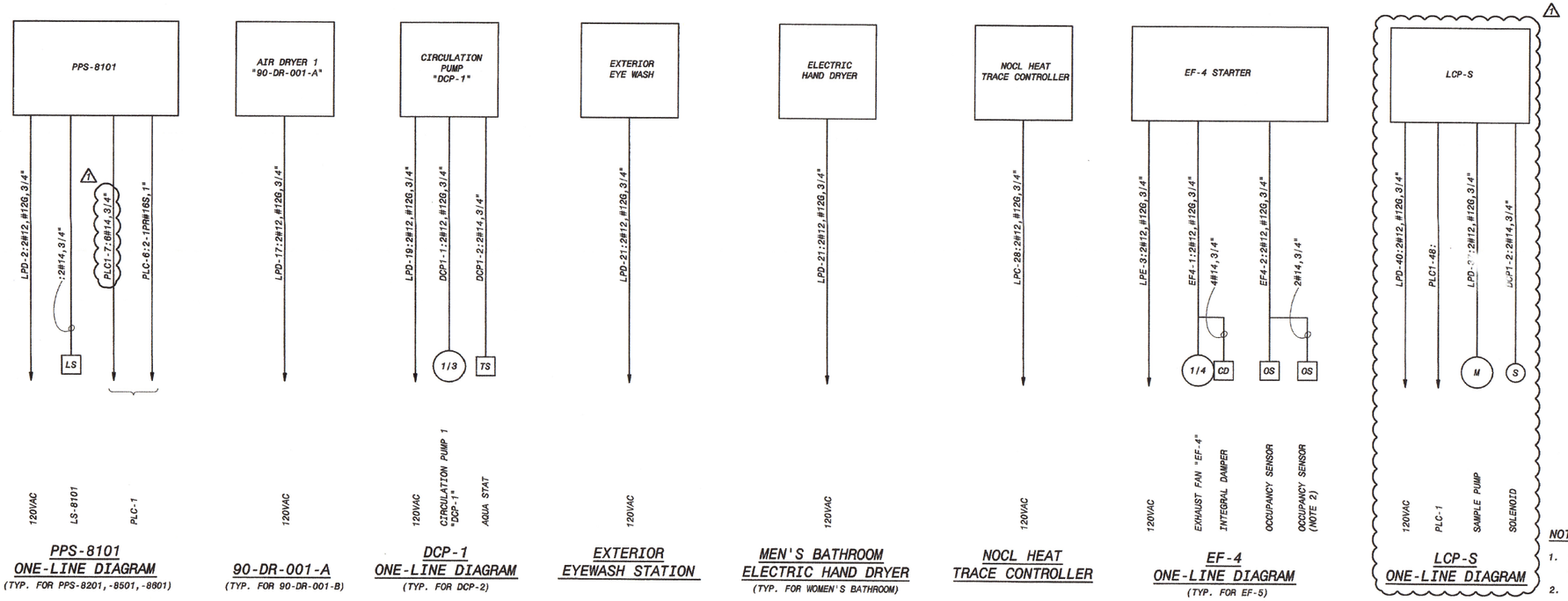
NOCL TRUCK UNLOADING PANEL
ONE-LINE DIAGRAM

CONTROL PANEL CP-11
ONE-LINE DIAGRAM

CONTROL PANEL CP-12
ONE-LINE DIAGRAM

CONTROL PANEL CP-13
ONE-LINE DIAGRAM

CONTROL PANEL CP-01
ONE-LINE DIAGRAM



PPS-8101
ONE-LINE DIAGRAM
(TYP. FOR PPS-8201,-8501,-8601)

90-DR-001-A
(TYP. FOR 90-DR-001-B)

DCP-1
ONE-LINE DIAGRAM
(TYP. FOR DCP-2)

EXTERIOR
EYEWASH STATION

MEN'S BATHROOM
ELECTRIC HAND DRYER
(TYP. FOR WOMEN'S BATHROOM)

NOCL HEAT
TRACE CONTROLLER

EF-4
ONE-LINE DIAGRAM
(TYP. FOR EF-5)

LCP-S
ONE-LINE DIAGRAM

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. SECOND OCCUPANCY SENSOR PROVIDED FOR EF-5 ONLY.

ISSUED FOR CONSTRUCTION

NO.	DATE	REVISIONS AND RECORD OF ISSUE	BY	CK	APP
1	07/18/18	ECN-013	ZKO	SDS	
0	07/11/16	ISSUED FOR CONSTRUCTION	ZKO	SDS	

JOB NO. 3040 - Electrical Drawings
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SAVED: DREW6994, 7/17/2018 5:34:17 PM
PLOTTED: HART6586, 6/12/2014 1:55:
USER: DREW6994 DWG VER: 1000
XREF1: BORDER.dwg
XREF2:
XREF3:
XREF4:

COMMONWEALTH OF VIRGINIA
Lic. No. 0402-032044
7/18/2018
PROFESSIONAL ENGINEER

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BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
MISCELLANEOUS ONE-LINE DIAGRAM

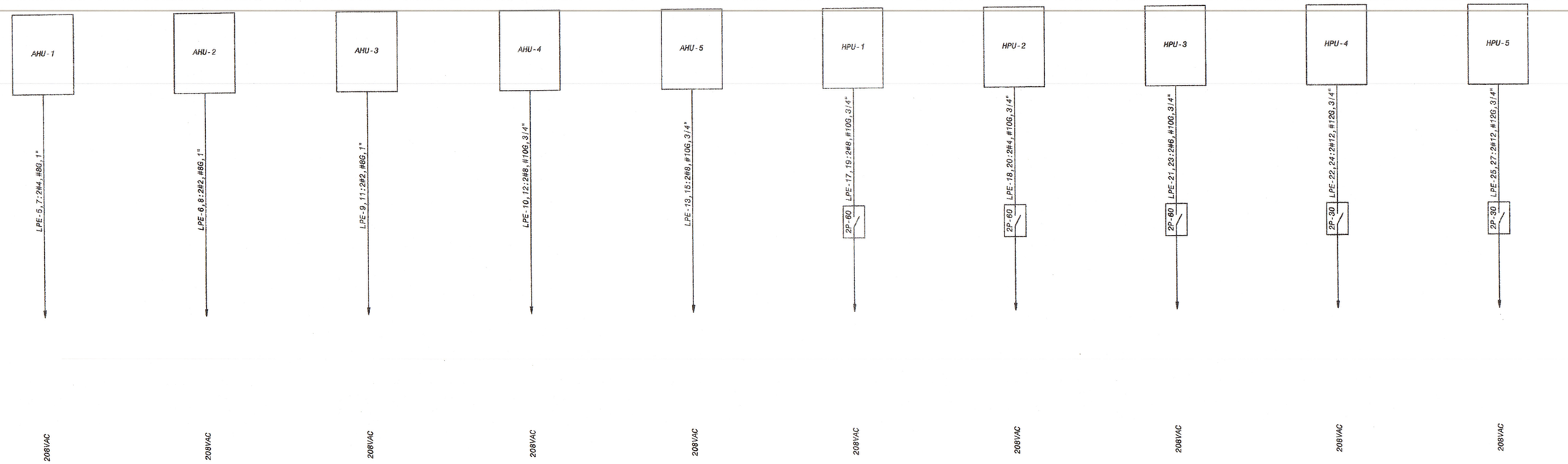
DESIGNED: ZKO
DETAILED: JES
CHECKED: SDS
APPROVED:
DATE: 07/18/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
189317

E-30-704
SHEET
OF

FD7000_PW
07000



AHU-1 ONE-LINE DIAGRAM

AHU-2 ONE-LINE DIAGRAM

AHU-3 ONE-LINE DIAGRAM

AHU-4 ONE-LINE DIAGRAM

AHU-5 ONE-LINE DIAGRAM

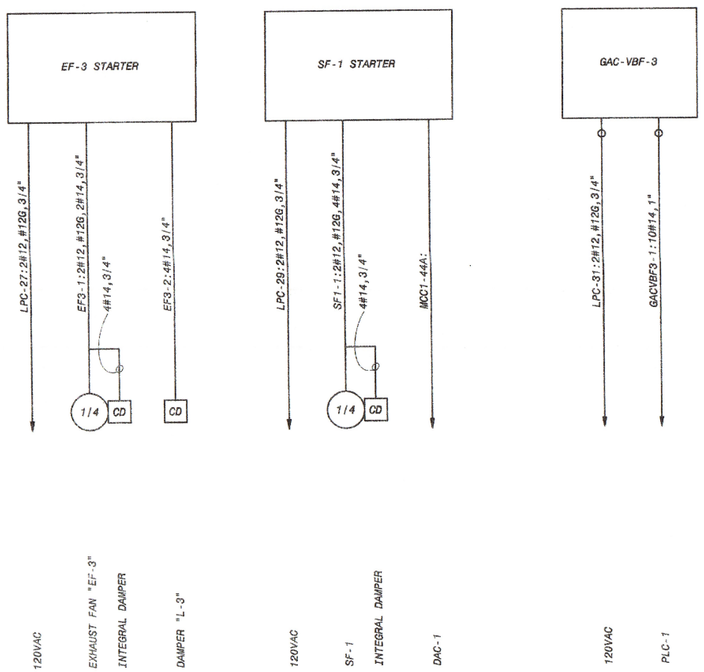
HPU-1 ONE-LINE DIAGRAM

HPU-2 ONE-LINE DIAGRAM

HPU-3 ONE-LINE DIAGRAM

HPU-4 ONE-LINE DIAGRAM

HPU-5 ONE-LINE DIAGRAM



EF-3 ONE-LINE DIAGRAM

SF-1 ONE-LINE DIAGRAM

GAC-VBF-3 ONE-LINE DIAGRAM

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

ISSUED FOR CONSTRUCTION

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
0	ZKO	SDS		01.11.16	ISSUED FOR CONSTRUCTION

DWG: 3040 - Electrical Drawings
DWG: 30-705.dwg
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PLOTTED: HART66969, 5/12/2014 1:53:
USER: DNE66894 DWG VER: 1000
XREF1: BORDER.dwg
XREF2:
XREF3:
XREF4:

COMMONWEALTH OF VIRGINIA
RICHARD D. SPOCCIA
Lic. No 0402-032079
1-13-2016
PROFESSIONAL ENGINEER

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Virginia Beach, VA

BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
MISCELLANEOUS ONE-LINE DIAGRAM

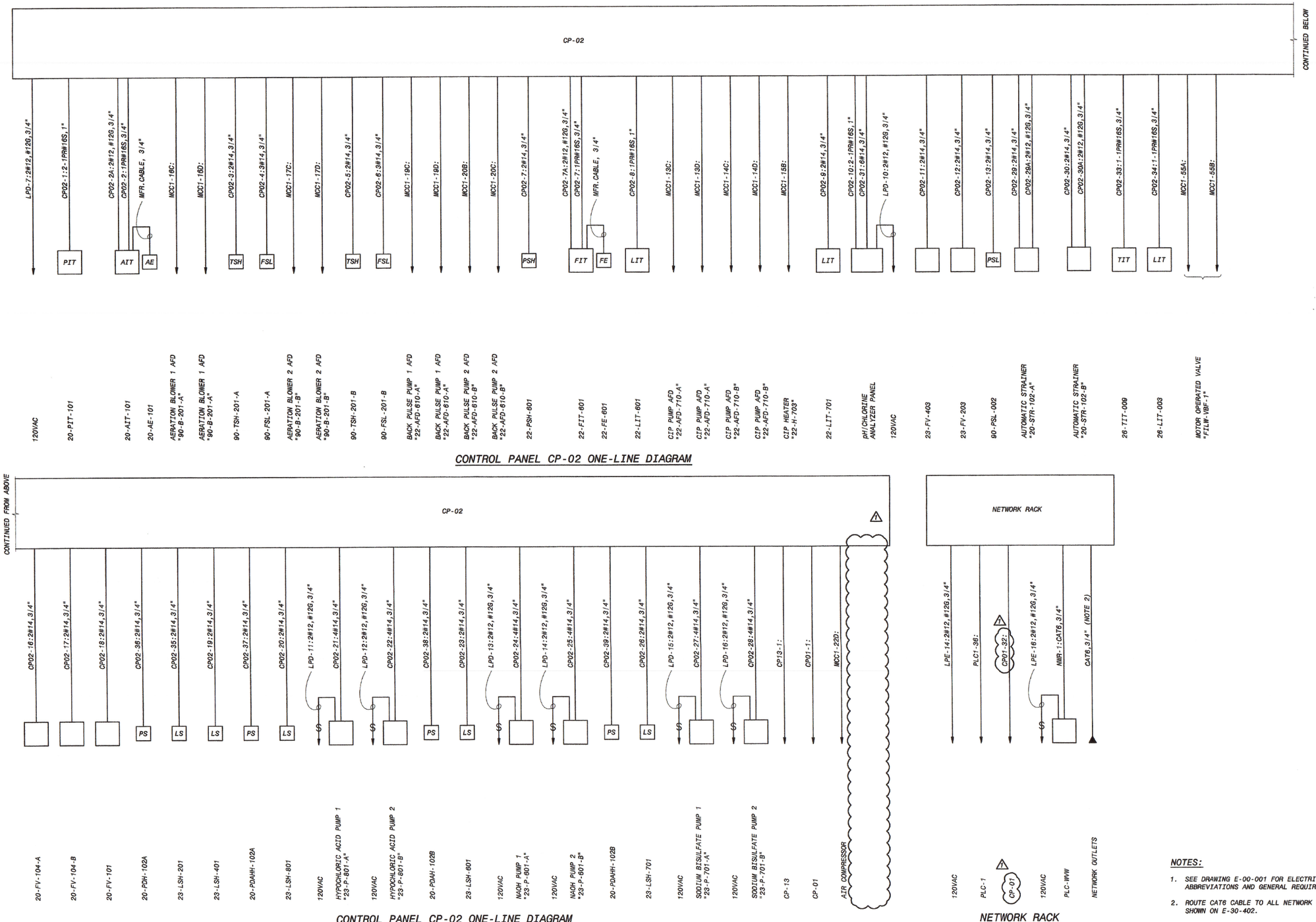
DESIGNED: ZKO
DETAILED: JES
CHECKED: SDS
APPROVED:
DATE: 01.11.16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 189317

E-30-705
SHEET
OF

F07000_PM
D7000



CONTROL PANEL CP-02 ONE-LINE DIAGRAM

CONTROL PANEL CP-02 ONE-LINE DIAGRAM

NETWORK RACK ONE-LINE DIAGRAM

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. ROUTE CAT6 CABLE TO ALL NETWORK OUTLETS AS SHOWN ON E-30-402.

ISSUED FOR CONSTRUCTION

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
1	ZKO	SGS		07/18/16	ECN-013
0	ZKO	SGS		01/11/16	ISSUED FOR CONSTRUCTION

FILE: 30-706.dwg XREF1: BORDER.dwg
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PLOTTED: HAR16586, 8/12/2014 1:53: XREF3:
USER: DNEB9894 DWG VER: 1000 XREF4:

COMMONWEALTH OF VIRGINIA — SCOTT D. STOCKAM — LIC. NO. 0402-032079 — PROFESSIONAL ENGINEER — 7-18-2016

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BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP & RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
PLC-2 ONE-LINE DIAGRAM

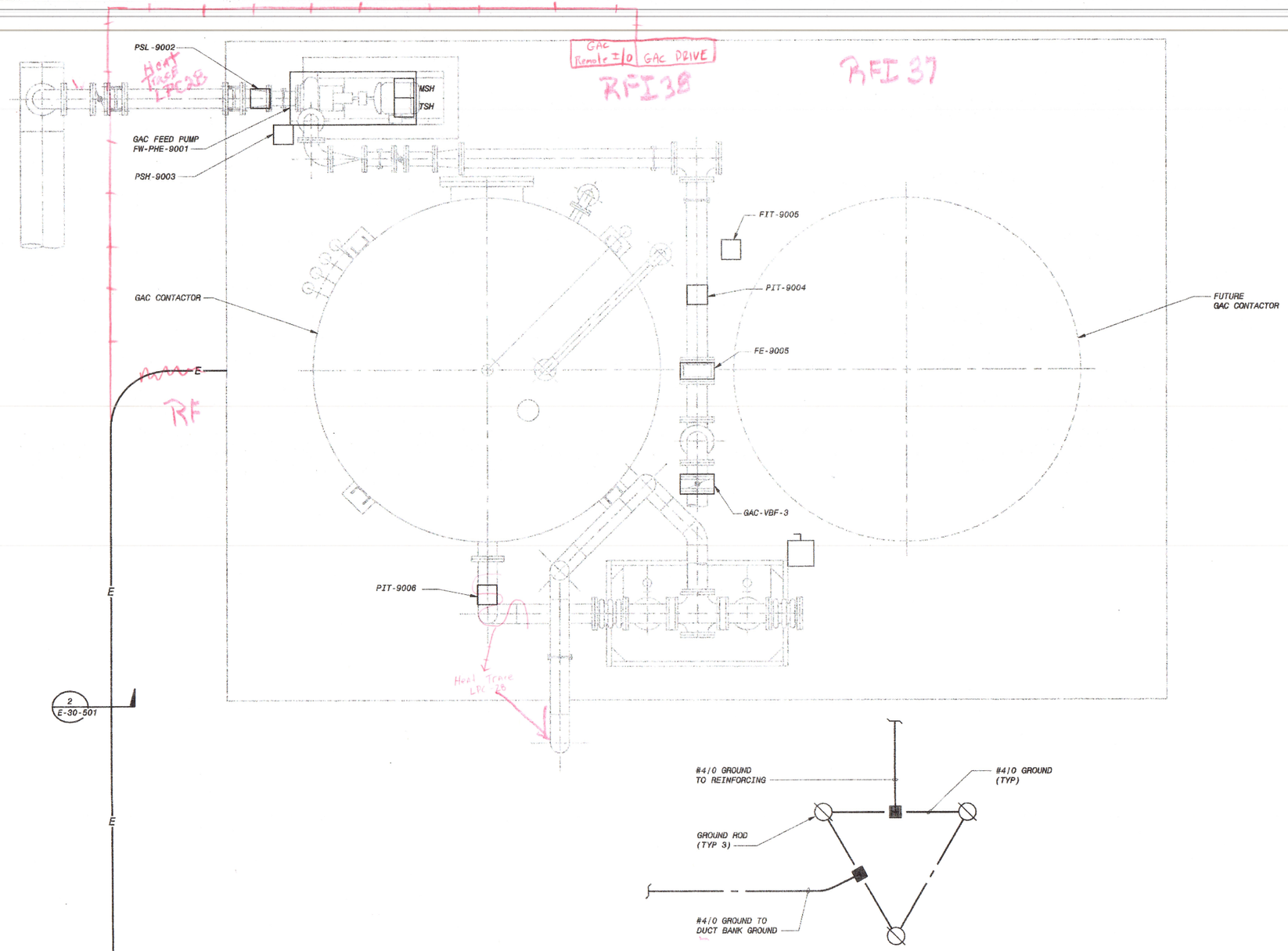
DESIGNED: ZKO
DETAILED: JES
CHECKED: SDS
APPROVED:
DATE: 07/18/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 189317

E-30-706
SHEET
OF

FD7000_PW
DT000



CONTINUED ON
SITE PLAN
E-30-101

GAC CONTACTOR AND PUMP AREA - POWER PLAN
1/2" = 1'-0"

NOTES:

1. SEE DRAWING E-00-0001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

4' 2' 0 4' 8'
1/4"=1'-0"

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NO.	BY	CK	APP
0	ZKO	SDS	

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DATE 01/11/16
REVISIONS AND RECORD OF ISSUE

50.3040 - Electrical Drawings
E-60-101.dwg
SAVED: DRE69694, 1/12/2016 10:24:09 AM
PLOTTED:
USER: DRE69694
DWG VER: 1000
XREF1:
XREF2:
XREF3:
XREF4:

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1-13-2016
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SMITH MOUNTAIN LAKE WTP &
RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
GAC CONTACTOR AND PUMP AREA
POWER PLAN

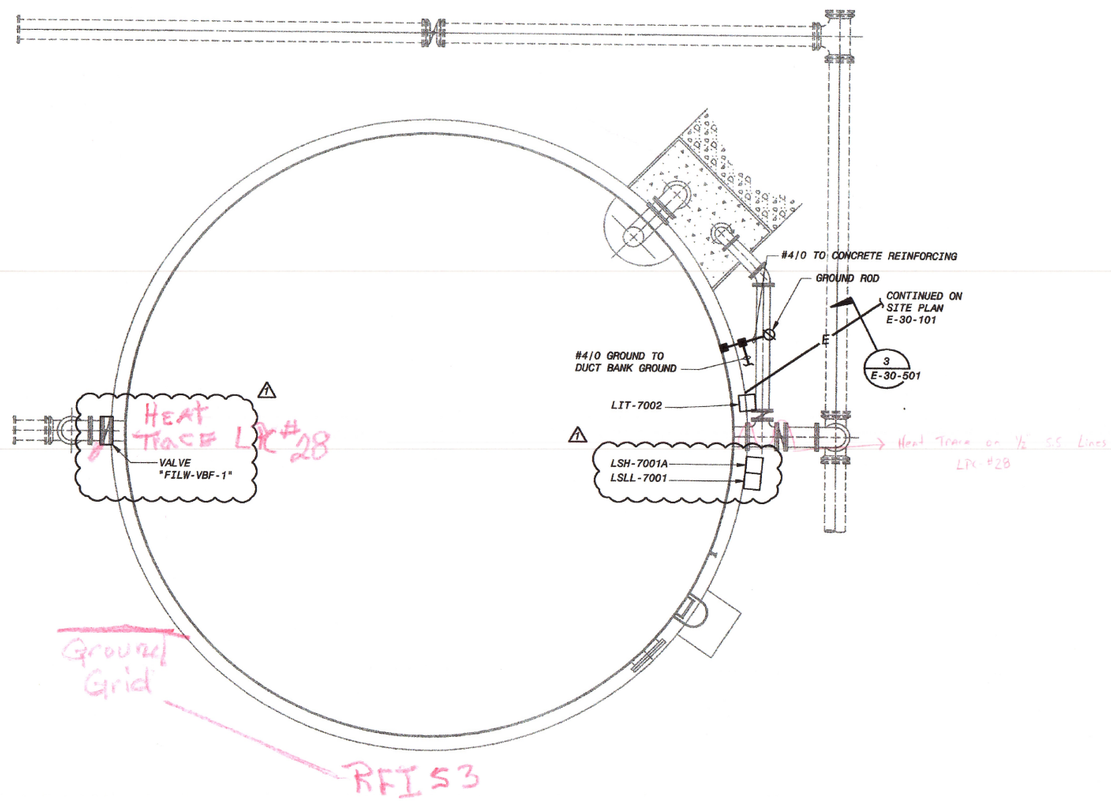
DESIGNED: ZKO
DETAILED: DGP
CHECKED: SDS
APPROVED:
DATE: 01/11/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
189317

E-60-101
SHEET
OF

FD7000
D7000



FINISHED WATER STORAGE TANK - POWER PLAN
3/16" = 1'-0"

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

6' 4' 2' 0 5' 10'
3/16"=1'-0"

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NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
1	ZKO	SDS		07/18/16	ECN-013
0	ZKO	SDS		01/11/16	ISSUED FOR CONSTRUCTION

60.3040 - Electrical Drawings
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SAVED: DREG0884, 7/11/2016 3:58:10 PM
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USER: DREG0884
DWG VER: 1000
XREF1:
XREF2:
XREF3:
XREF4:

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BEDFORD REGIONAL WATER AUTHORITY
SMITH MOUNTAIN LAKE WTP &
RAW WATER PUMPING STATION / INTAKE

ELECTRICAL
FINISHED WATER STORAGE TANK
POWER PLAN

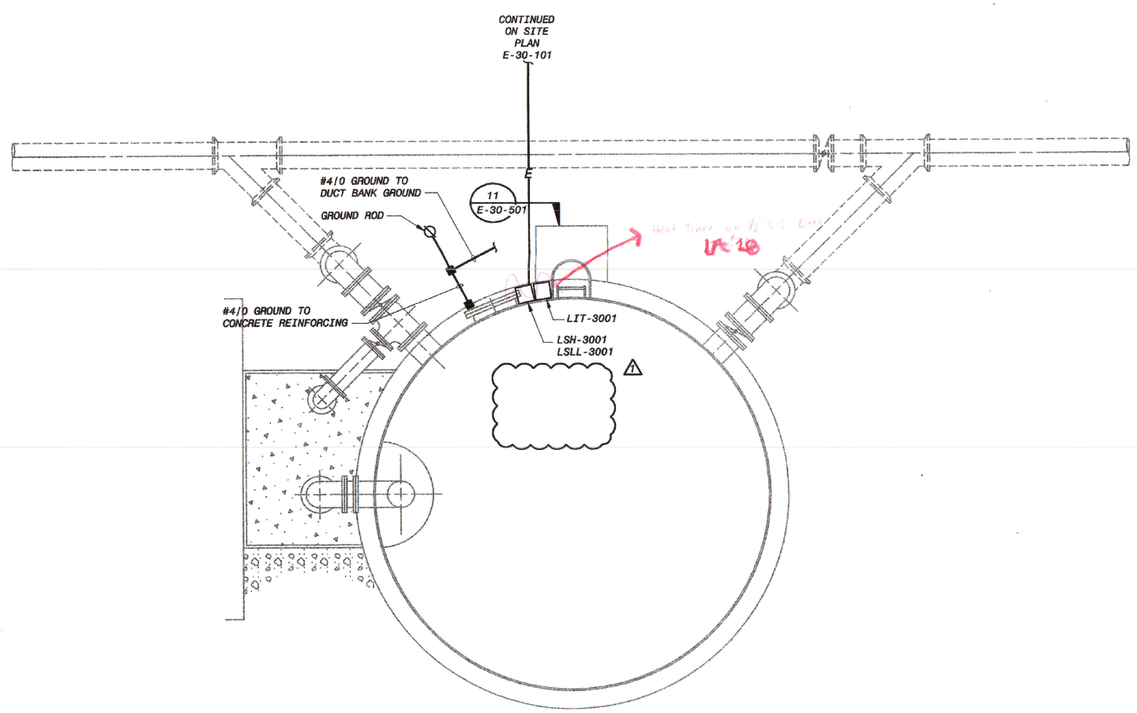
DESIGNED: ZKO
DETAILED: DGP
CHECKED: SDS
APPROVED:
DATE: 07/18/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
189317

E-80-101
SHEET
OF

FD7000
DT000



NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

4' 2' 0 4' 8'
1/4"=1'-0"

ISSUED FOR CONSTRUCTION

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
0	ZKO	SDS		07/18/16	ECN-013
1	ZKO	SDS		07/11/16	ISSUED FOR CONSTRUCTION

50.3040 - Electrical Drawings

E-85-101.dwg

SAVED: DREG9694, 7/7/2016 2:19:01 PM

PLOTTED:

USER: DREG9694

DWG VER: 1000

XREF1:
XREF2:
XREF3:
XREF4:

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RAW WATER PUMPING STATION / INTAKE

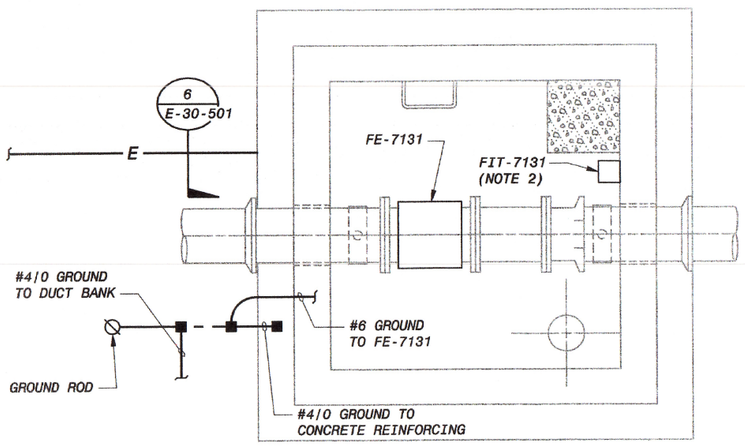
ELECTRICAL
RAW WATER STORAGE TANK
POWER PLAN

DESIGNED: ZKO
DETAILED: DGP
CHECKED: SDS
APPROVED:
DATE: 07/18/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

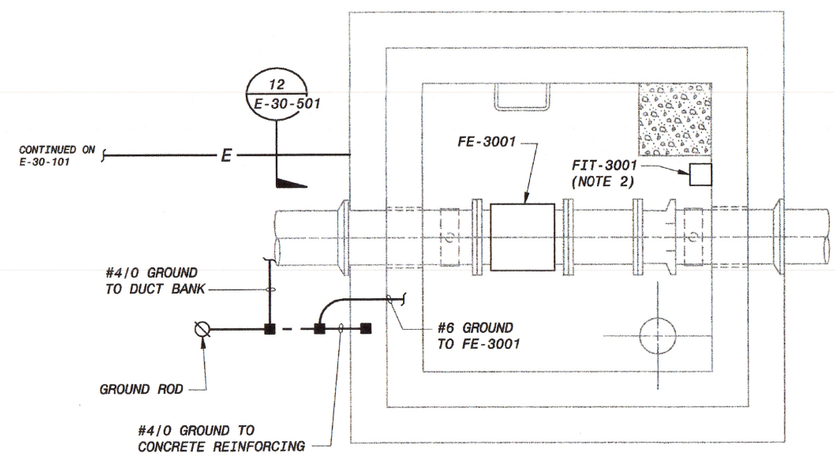
PROJECT NO.
189317

E-85-101
SHEET
OF



CONTINUED ON
E-30-101

FINISHED WATER FLOW METER VAULT
POWER PLAN
1/2" = 1'-0"



RAW WATER FLOW METER VAULT
POWER PLAN
1/2" = 1'-0"

NOTES:

1. SEE DRAWING E-00-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. FLOW METER SHALL BE MOUNTED ON AN EQUIPMENT STAND ON TOP OF THE VAULT.

12" 6" 0 1' 2' 3' 4' 5'
1/2"=1'-0"

ISSUED FOR CONSTRUCTION

NO.	BY	CK	APP
0	ZKO	SDS	

01/11/16 ISSUED FOR CONSTRUCTION

DATE REVISIONS AND RECORD OF ISSUE

50.3040 - Electrical Drawings

E-90-101.dwg

SAVED: DRE69694, 12/22/2015 10:10:20 AM

PLOTTED:

USER: DRE69694

XREF1:
XREF2:
XREF3:
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DWG VER: 1000

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Lic. No. 0402-032079
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1-13-2016

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ELECTRICAL
FLOW METER VAULTS
POWER PLANS

DESIGNED: ZKO
DETAILED: DGP
CHECKED: SDS
APPROVED:
DATE: 01/11/16

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
189317

E-90-101
SHEET
OF

F07000
D7000