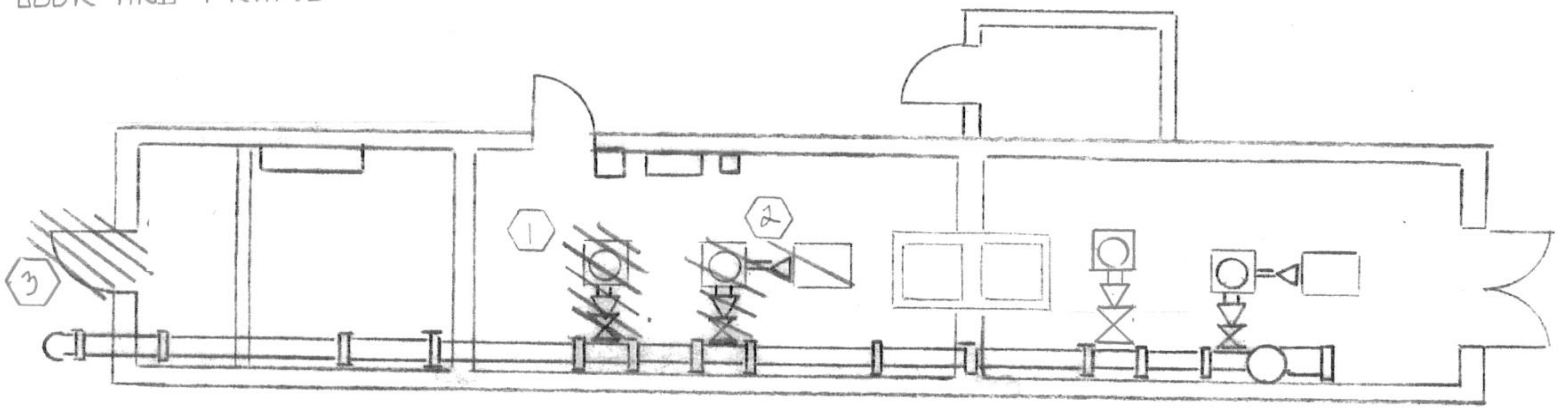
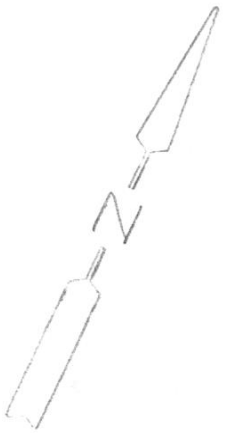
KEYED NOTES, DEMOLISH:

1. Pump 4, Motor, Check valve, Gate, valve
2. Check valve, Gate valve
3. DOOR AND FRAME





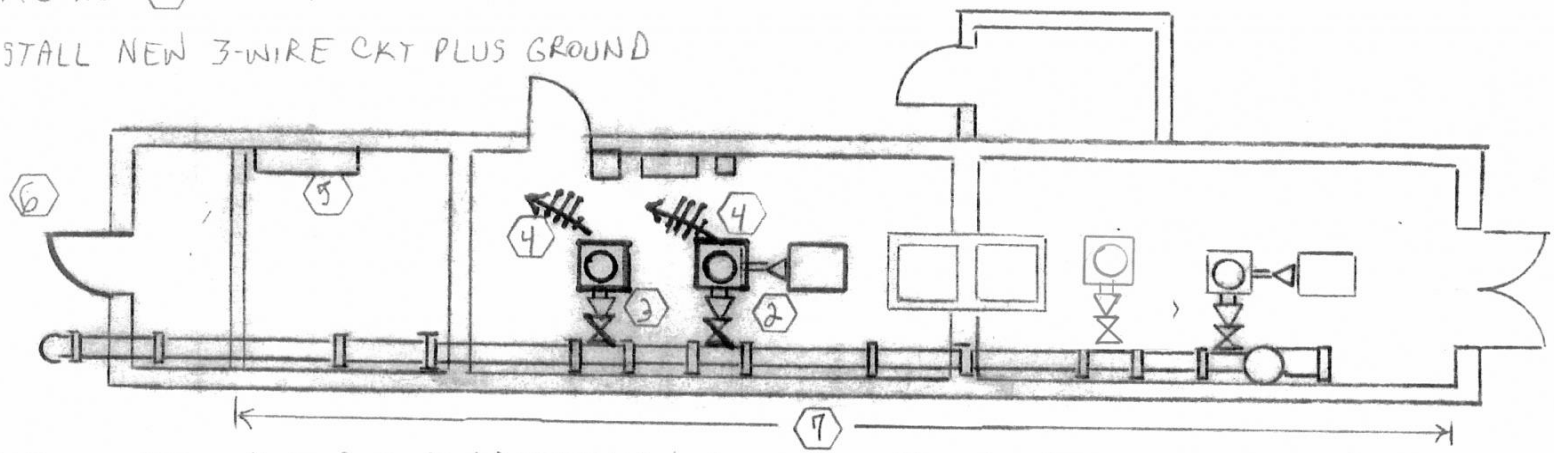
DEMOLITION PLAN

REPLACE PUMPS T-925

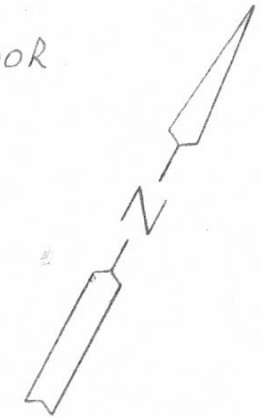
NTS MQNA 05-1035

KEYED NOTES:

1. NOT USED
2. INSTALL NEW LOW-HEAD PUMP, MOTOR, CHECK VALVE, GATE VALVE
3. SAME AS 2
4. INSTALL NEW 3-WIRE CKT PLUS GROUND



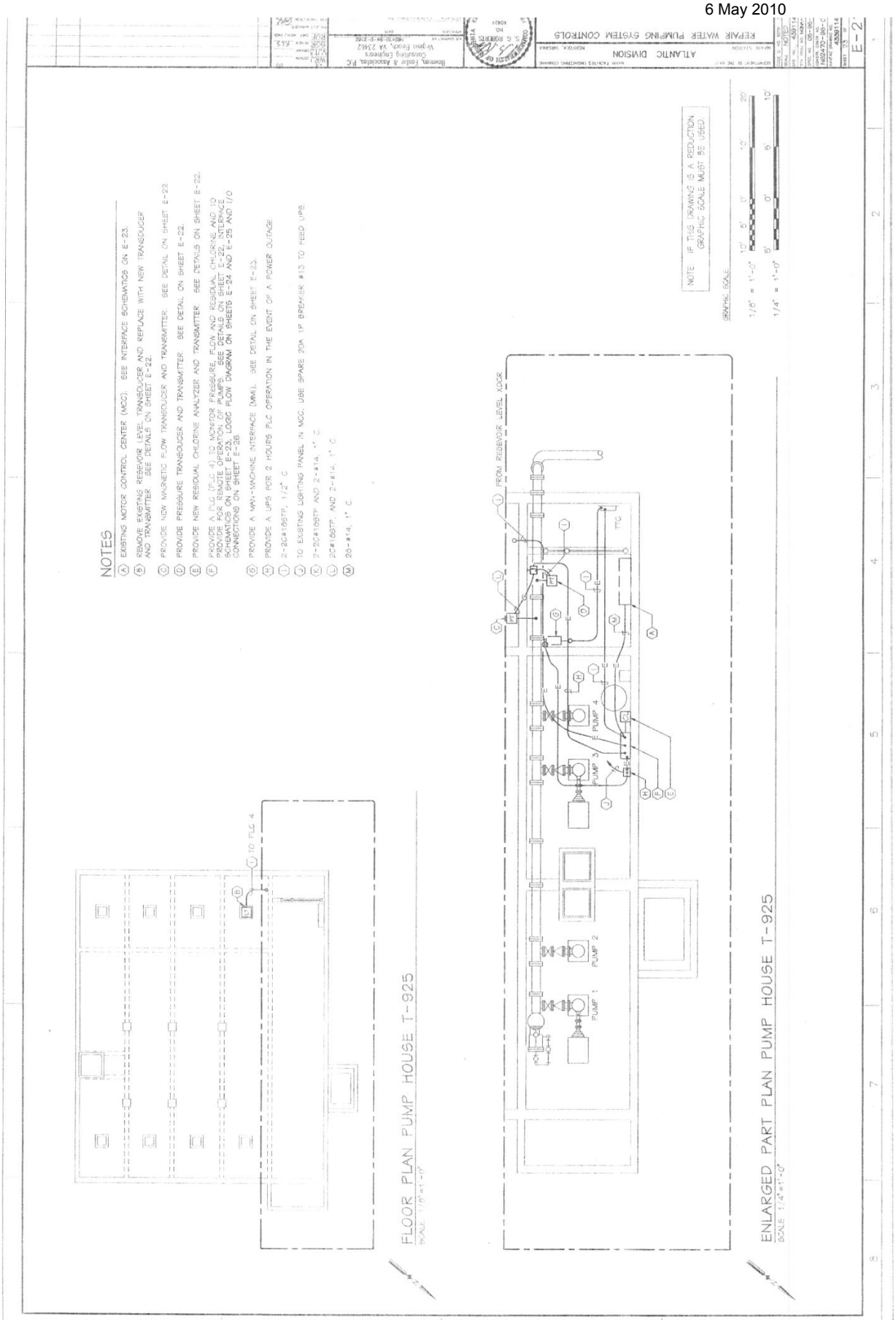
5. INSTALL NEW MOTOR CKT PROTECTION. CONNECT TO SCADA SYSTEM
6. INSTALL NEW METAL DOOR/FRAME/LOCK
7. PREPARE AND EPOXY FLOOR

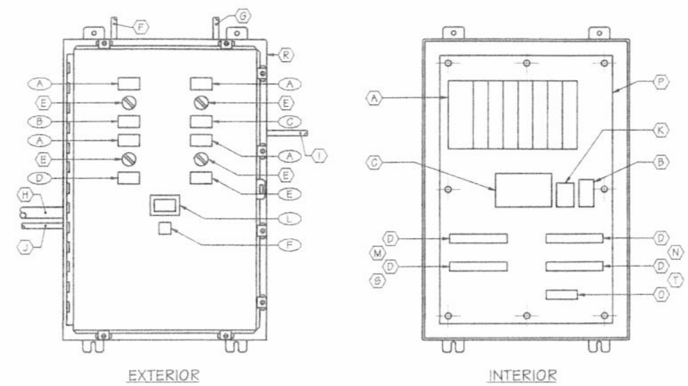


NEW WORK PLAN

REPLACE PUMPS T-925

NTS MQNA 05-1035


NOTES
A EXISTING MOTOR CONTROL CENTER (MCC). SEE INTERFACE SCHEMATICS ON E-23.
B REMOVE EXISTING RESEVOIR LEVEL TRANSDUCER AND REPLACE WITH NEW TRANSDUCER AND TRANSMITTER. SEE DETAILS ON SHEET E-22.
C PROVIDE NEW MAGNETIC FLOW TRANSDUCER AND TRANSMITTER. SEE DETAIL ON SHEET E-23.
D PROVIDE PRESSURE TRANSDUCER AND TRANSMITTER. SEE DETAIL ON SHEET E-22.
E PROVIDE NEW RESIDUAL CHLORINE ANALYZER AND TRANSMITTER. SEE DETAILS ON SHEET E-22.
F PROVIDE A PLC (PLC 4) TO MONITOR PRESSURE, FLOW AND RESIDUAL CHLORINE AND TO PROVIDE FOR REMOTE OPERATION OF PUMPS. SEE DETAILS ON SHEET E-22, INTERFACE SCHEMATICS ON SHEET E-23, LOGIC FLOW DIAGRAM ON SHEETS E-24 AND E-25 AND I/O CONNECTIONS ON SHEET E-26.
G PROVIDE A MAN-MACHINE INTERFACE (MMI). SEE DETAIL ON SHEET E-23.
H PROVIDE A UPS FOR 2 HOURS PLC OPERATION IN THE EVENT OF A POWER OUTAGE.
I 2-2C#10STP, 1/2" C
J TO EXISTING LIGHTING PANEL IN MCC, USE SPARE 20A 1P BREAKER #13 TO FEED UPS.
K 2-2C#10STP AND 2-#14, 1" C
L 2C#10STP AND 2-#14, 1" C
M 2#-#14, 1" C
NOTE: IF THIS DRAWING IS A REDUCTION GRAPHIC SCALE MUST BE USED.
GRAPHIC SCALE
1/8" = 1'-0"
1/4" = 1'-0"
ATLANTIC DIVISION
REPAIR WATER PUMPING SYSTEM CONTROLS
Bonnell, Foster & Associates, P.C.
Consulting Engineers
Virginia Beach, VA 23462
E-2
TO PLC 4
FLOOR PLAN PUMP HOUSE T-925
SCALE 1/8"=1'-0"
FROM RESEVOIR LEVEL XDCR
PUMP 1
PUMP 2
PUMP 3
PUMP 4
ENLARGED PART PLAN PUMP HOUSE T-925
SCALE 1/4"=1'-0"

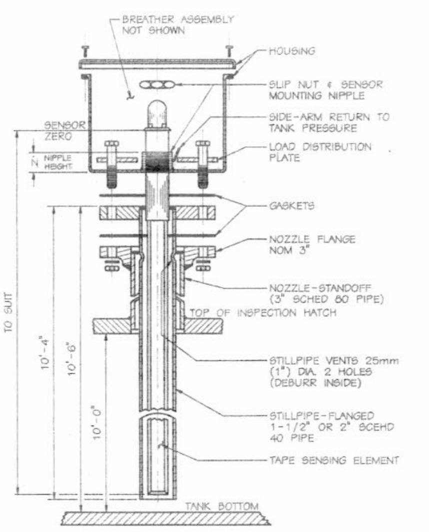


CONTROL CABINET DETAILS
NO SCALE

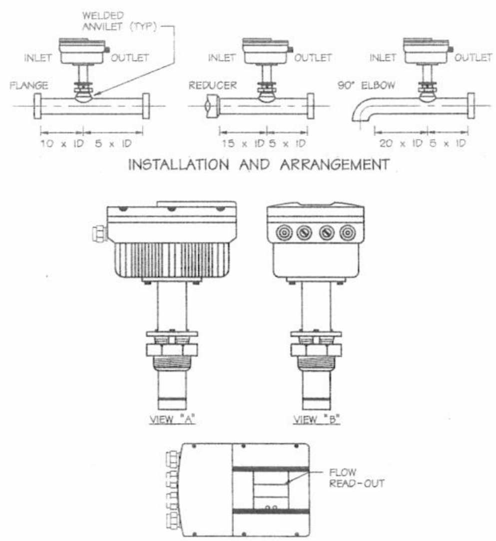
NOTES

- (A) PLC 4
- (B) 15A, 120V, 1P BREAKER (AC POWER).
- (C) 24VDC I/O POWER SUPPLY. SIZE TO POWER FLOW TRANSDUCER.
- (D) TERMINAL STRIP.
- (E) 3-POSITION SELECTOR SWITCH.
- (F) 1"C FROM LEVEL, FLOW & PRESSURE TRANSDUCER (3-2/C #16 STP & 2 #14).
- (G) 3/4"C FROM TTC (2)C #16 STP).
- (H) 1"C FROM MCC (2G #14).
- (I) 3/4"C FROM CHLORINE ANALYZER (2/C #16 STP & 3 #14).
- (J) 1/2"C FROM UPS (2 #12 & 1 #12G).
- (K) 10A, 120V, 1P BREAKER (CHLORINE ANALYZER).
- (L) DIGITAL METER FOR RESEVOIR LEVEL.
- (M) PUMP 1 INTERFACE WIRING.
- (N) PUMP 2 INTERFACE WIRING.
- (O) LINE DIVER
- (P) BACK BOARD
- (R) NEMA 4X ENCLOSURE
- (S) PUMP 3 INTERFACE WIRING
- (T) PUMP 4 INTERFACE WIRING.

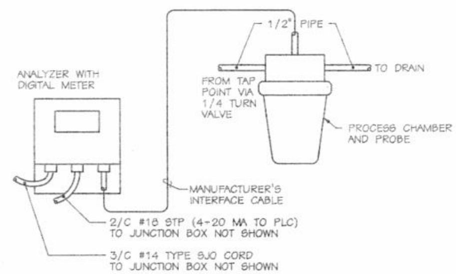
MARK	TEXT		
(A)	"REMOTE"	"LOCAL"	"OFF"
(B)	"PUMP NO. 1"		
(C)	"PUMP NO. 2"		
(D)	"PUMP NO. 3"		
(E)	"PUMP NO. 4"		
(F)	"RESEVOIR LEVEL"		



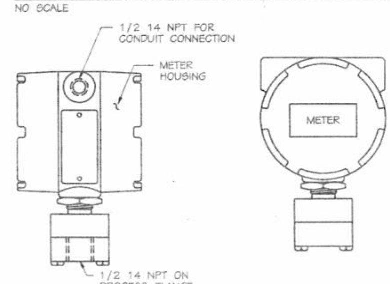
RESEVOIR LEVEL SENSOR DETAIL
NO SCALE (INPUT "4 LVL")



FLOW TRANSDUCER DETAIL
NO SCALE (INPUT "4 FLOW")



CHLORINE ANALYZER DETAIL (INPUT "4CHLOR")
NO SCALE



PRESSURE TRANSDUCER DETAIL
NO SCALE (INPUT "4 PRESS")

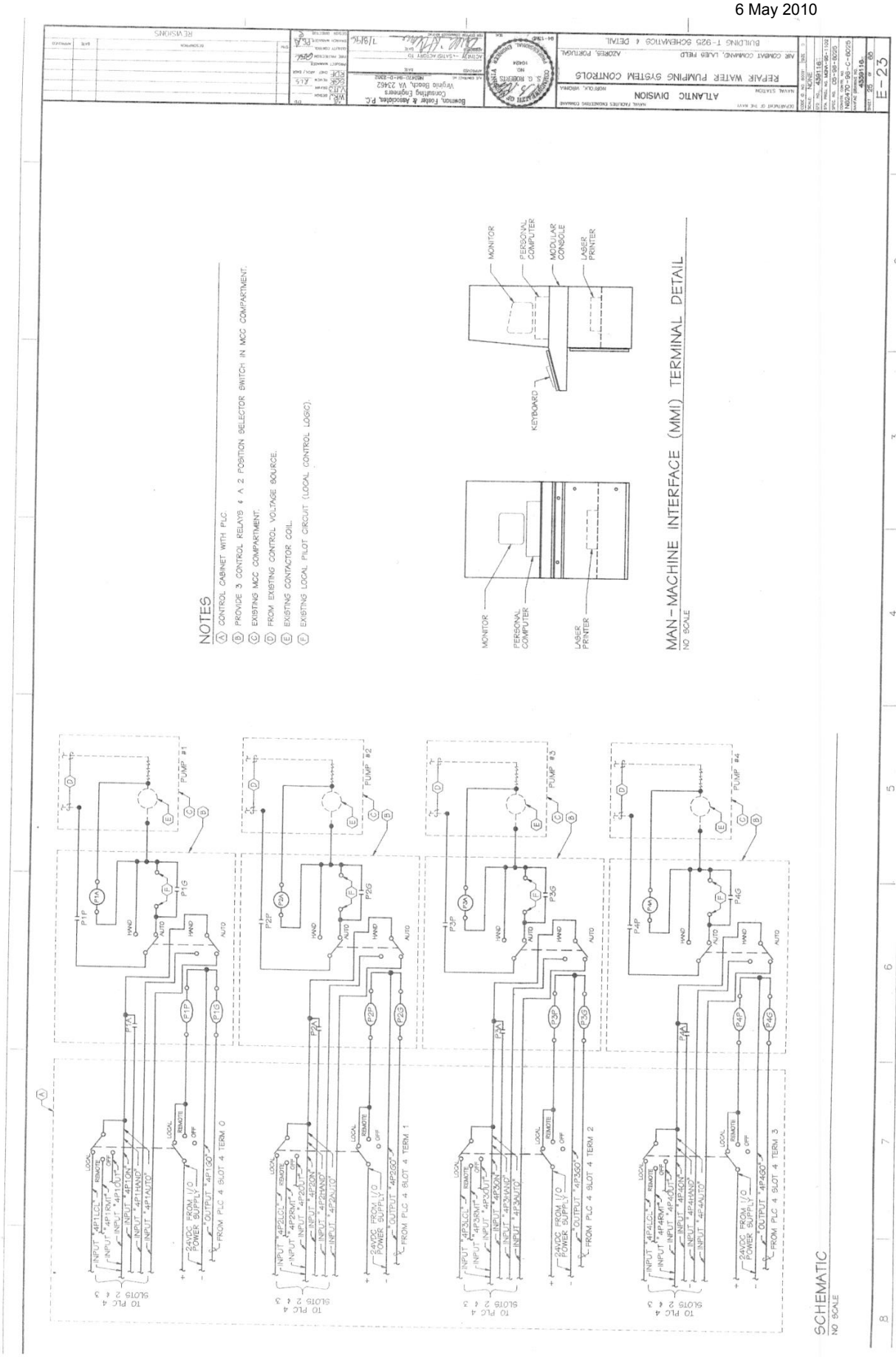
REVISIONS

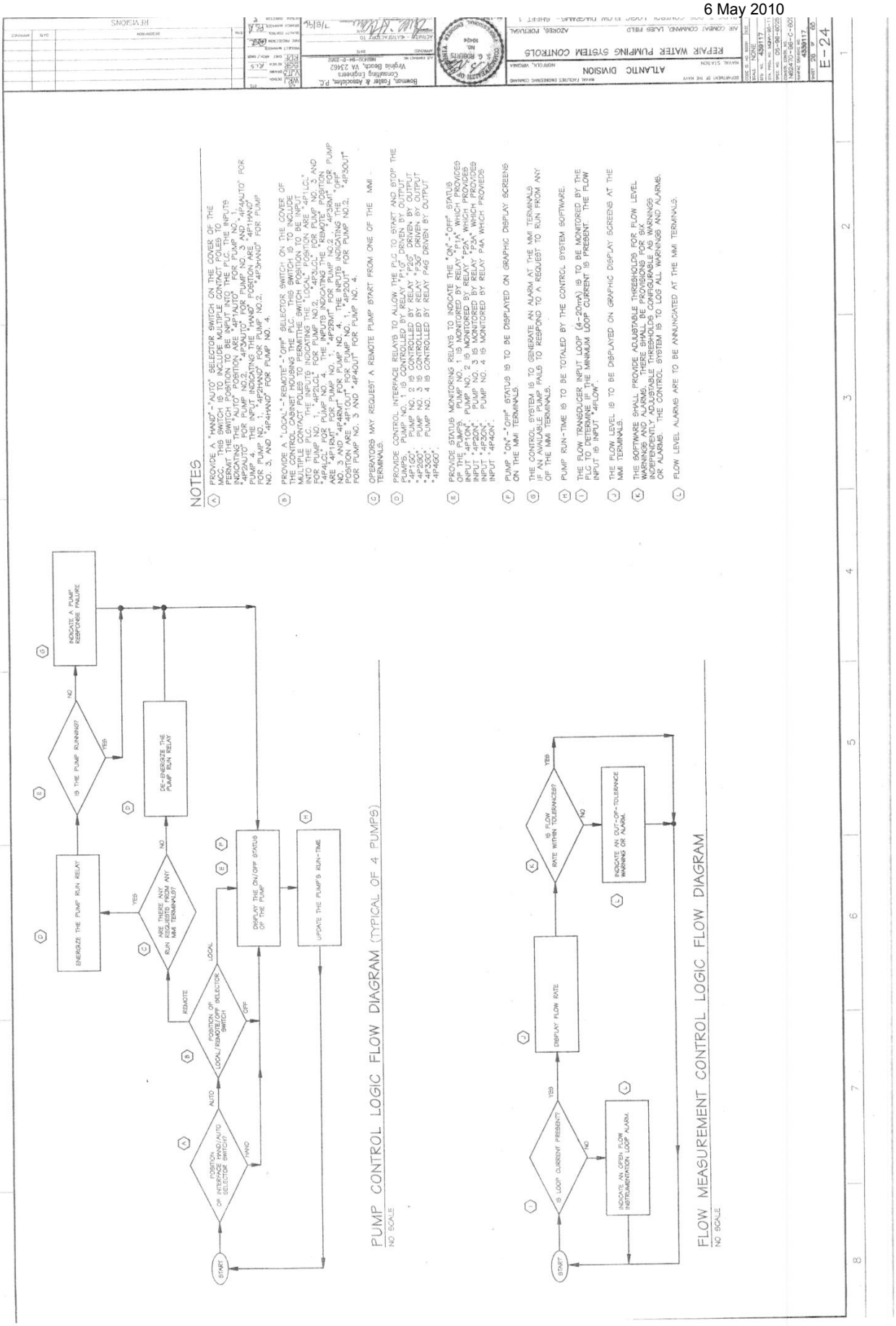
Bowman, Foster & Associates, P.C.
Consulting Engineers
Virginia Beach, VA 23462

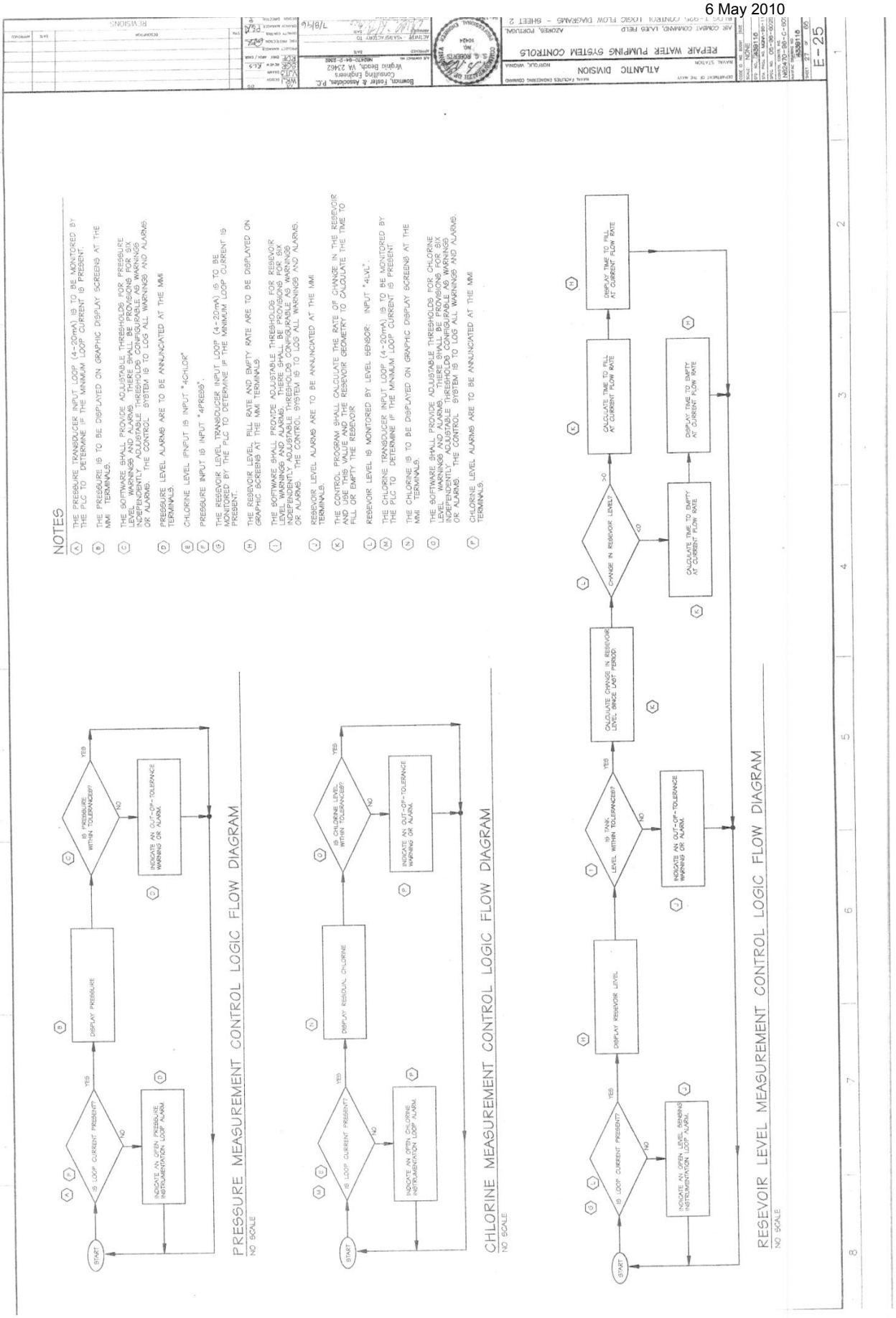
S. G. ROBERTS
NO. 10424

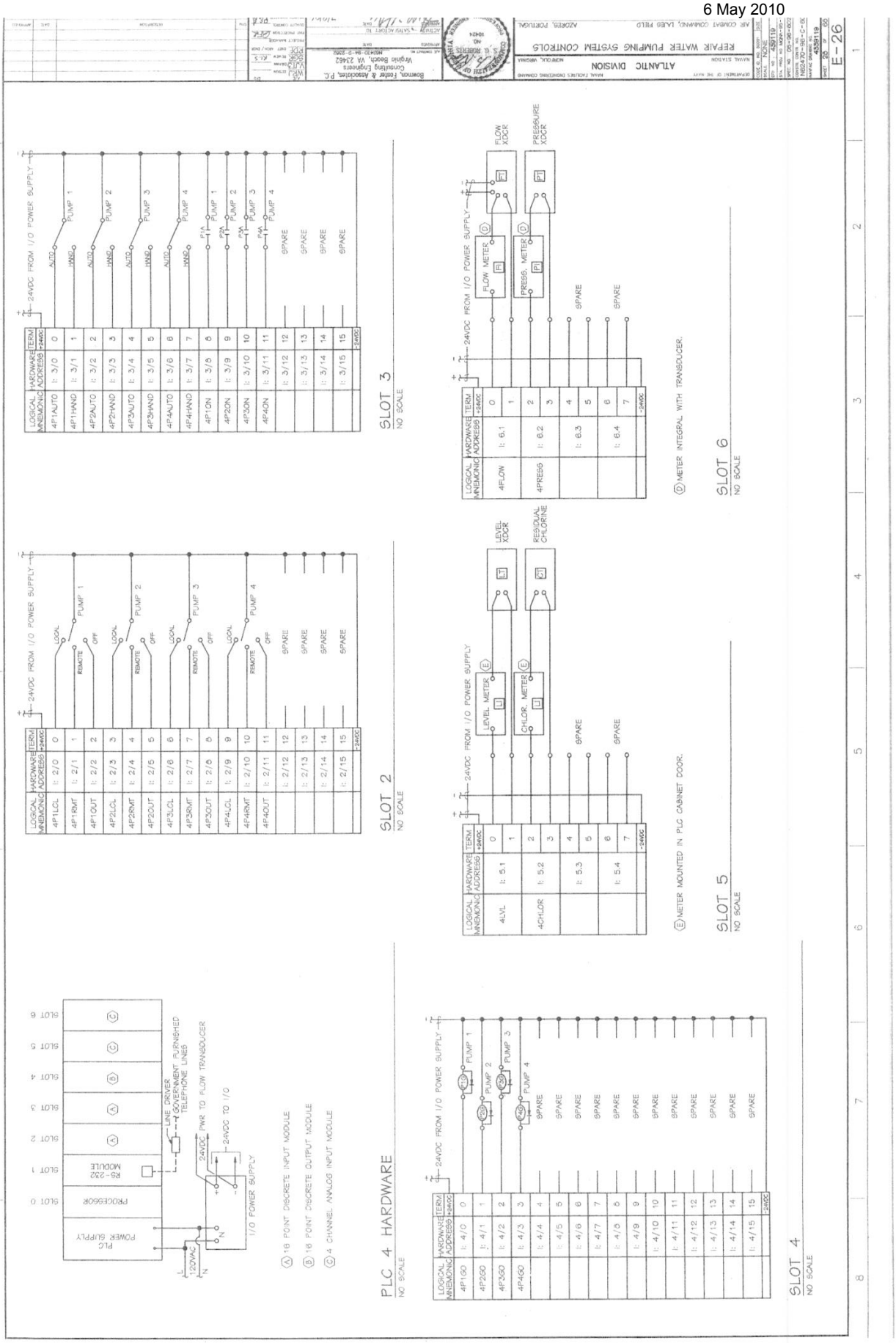
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION NORFOLK, VIRGINIA
REPAIR WATER PUMPING SYSTEM CONTROLS
AIR COMBAT COMMAND, LAJES FIELD AZORES, PORTUGAL
BUILDING T-925 DETAILS

SCALE: NONE
439115
N62470-96-C-6025
4339115
SHEET 24 OF 66
E-22


NOTES
A CONTROL CABINET WITH PLC.
B PROVIDE 3 CONTROL RELAYS & A 2 POSITION SELECTOR SWITCH IN MCC COMPARTMENT.
C EXISTING MCC COMPARTMENT.
D FROM EXISTING CONTROL VOLTAGE SOURCE.
E EXISTING CONTACTOR COIL.
F EXISTING LOCAL PILOT CIRCUIT (LOCAL CONTROL LOGIC).
MONITOR
PERSONAL COMPUTER
MODULAR CONSOLE
LASER PRINTER
KEYBOARD
MAN-MACHINE INTERFACE (MMI) TERMINAL DETAIL
NO SCALE
SCHEMATIC
NO SCALE
PUMP #1
PUMP #2
PUMP #3
PUMP #4
FROM PLC 4 SLOT 4 TERM 0
FROM PLC 4 SLOT 4 TERM 1
FROM PLC 4 SLOT 4 TERM 2
FROM PLC 4 SLOT 4 TERM 3
24VDC FROM I/O POWER SUPPLY
TO PLC 4 SLOTS 2 & 3
REVISIONS
ATLANTIC DIVISION
REFAIR WATER PUMPING SYSTEM CONTROLS
BUILDING T-925 SCHEMATICS & DETAIL
AIR COMBAT COMMAND, LAJES FIELD, AZORES, PORTUGAL
Boomsma, Fetter & Associates, P.C.
Consulting Engineers
Virginia Beach, VA 23462
E-23


NOTES
A PROVIDE A "HAND"-"AUTO" SELECTOR SWITCH ON THE COVER OF THE CONTROL PANEL TO INCLUDE MULTIPLE CONTACT POLES TO PERMIT THE SWITCH POSITION TO BE INPUT INTO THE PLC. THE INPUTS INDICATING THE "AUTO" POSITION ARE "4P1AUTO" FOR PUMP NO. 1, "4P2AUTO" FOR PUMP NO.2, "4P3AUTO" FOR PUMP NO. 3 AND "4P4AUTO" FOR PUMP 4. THE INPUTS INDICATING THE "HAND" POSITION ARE "4P1HAND" FOR PUMP NO. 1, "4P2HAND" FOR PUMP NO.2, "4P3HAND" FOR PUMP NO. 3, AND "4P4HAND" FOR PUMP NO. 4.
B PROVIDE A "LOCAL"-"REMOTE"-"OFF" SELECTOR SWITCH ON THE COVER OF THE CONTROL PANEL TO INCLUDE MULTIPLE CONTACT POLES TO PERMIT THE SWITCH POSITION TO BE INPUT INTO THE PLC. THE INPUTS INDICATING THE "LOCAL" POSITION ARE "4P1LCL" FOR PUMP NO.1, "4P2LCL" FOR PUMP NO.2, "4P3LCL" FOR PUMP NO. 3, AND "4P4LCL" FOR PUMP NO. 4. THE INPUTS INDICATING THE "REMOTE" POSITION ARE "4P1RMT" FOR PUMP NO. 1, "4P2RMT" FOR PUMP NO.2, "4P3RMT" FOR PUMP NO. 3 AND "4P4RMT" FOR PUMP NO. 4. THE INPUTS INDICATING THE "OFF" POSITION ARE "4P1OUT" FOR PUMP NO. 1, "4P2OUT" FOR PUMP NO.2, "4P3OUT" FOR PUMP NO. 3 AND "4P4OUT" FOR PUMP NO. 4.
C OPERATORS MAY REQUEST A REMOTE PUMP START FROM ONE OF THE NMI TERMINALS.
D PROVIDE CONTROL INTERFACE RELAYS TO ALLOW THE PLC TO START AND STOP THE PUMPS. PUMP NO. 1 IS CONTROLLED BY RELAY "P1G" WHICH PROVIDES "4P1GO". PUMP NO. 2 IS CONTROLLED BY RELAY "P2G" DRIVEN BY OUTPUT "4P2GO". PUMP NO. 3 IS CONTROLLED BY RELAY "P3G" DRIVEN BY OUTPUT "4P3GO". PUMP NO. 4 IS CONTROLLED BY RELAY P4G DRIVEN BY OUTPUT "4P4GO".
E PROVIDE STATUS MONITORING RELAYS TO INDICATE THE "ON"-"OFF" STATUS OF THE PUMPS. PUMP NO. 1 IS MONITORED BY RELAY "P1A" WHICH PROVIDES INPUT "4P1ON". PUMP NO. 2 IS MONITORED BY RELAY "P2A" WHICH PROVIDES INPUT "4P2ON". PUMP NO. 3 IS MONITORED BY RELAY "P3A" WHICH PROVIDES INPUT "4P3ON". PUMP NO. 4 IS MONITORED BY RELAY P4A WHICH PROVIDES INPUT "4P4ON".
F PUMP "ON"-"OFF" STATUS IS TO BE DISPLAYED ON GRAPHIC DISPLAY SCREENS ON THE NMI TERMINALS.
G THE CONTROL SYSTEM IS TO GENERATE AN ALARM AT THE NMI TERMINALS IF AN AVAILABLE PUMP FAILS TO RESPOND TO A REQUEST TO RUN FROM ANY OF THE NMI TERMINALS.
H PUMP RUN-TIME IS TO BE TOTALED BY THE CONTROL SYSTEM SOFTWARE.
I THE FLOW TRANSDUCER INPUT LOOP (4-20mA) IS TO BE MONITORED BY THE PLC TO DETERMINE IF THE MINIMUM LOOP CURRENT IS PRESENT. THE FLOW INPUT IS INPUT "4FLOW".
J THE FLOW LEVEL IS TO BE DISPLAYED ON GRAPHIC DISPLAY SCREENS AT THE NMI TERMINALS.
K THE SOFTWARE SHALL PROVIDE ADJUSTABLE THRESHOLDS FOR FLOW LEVEL WARNINGS AND ALARMS. THERE SHALL BE PROVISIONS FOR SIX INDEPENDENTLY ADJUSTABLE THRESHOLDS CONFIGURABLE AS WARNINGS OR ALARMS. THE CONTROL SYSTEM IS TO LOG ALL WARNINGS AND ALARMS.
L FLOW LEVEL ALARMS ARE TO BE ANNUNCIATED AT THE NMI TERMINALS.
PUMP CONTROL LOGIC FLOW DIAGRAM (TYPICAL OF 4 PUMPS)
NO SCALE
START
POSITION OF HAND/AUTO OR INTERFACE MODE SELECTOR SWITCH?
AUTO
HAND
POSITION OF LOCAL/REMOTE/OFF SELECTOR SWITCH
LOCAL
REMOTE
OFF
ARE THERE ANY RUN REQUESTS FROM ANY NMI TERMINALS?
YES
NO
DISPLAY THE ON/OFF STATUS OF THE PUMP
UPDATE THE PUMP'S RUN-TIME
DE-ENERGIZE THE PUMP RUN RELAY
IS THE PUMP RUNNING?
YES
NO
ENERGIZE THE PUMP RUN RELAY
INDICATE A PUMP RESPONSE FAILURE
FLOW MEASUREMENT CONTROL LOGIC FLOW DIAGRAM
NO SCALE
START
IS LOOP CURRENT PRESENT?
YES
NO
INDICATE AN OPEN FLOW INSTRUMENTATION LOOP ALARM.
DISPLAY FLOW RATE
IS FLOW RATE WITHIN TOLERANCE?
YES
NO
INDICATE AN OUT-OF-TOLERANCE WARNING OR ALARM.
REPAIR WATER PUMPING SYSTEM CONTROLS
AIR COMBAT COMMAND, LABS FIELD
AZORES, PORTUGAL
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA
Bowman, Fowler & Associates, P.C.
Consulting Engineers
Virginia Beach, VA 23462
E-24


NOTES
A THE PRESSURE TRANSDUCER INPUT LOOP (4-20mA) IS TO BE MONITORED BY THE PLC TO DETERMINE IF THE MINIMUM LOOP CURRENT IS PRESENT.
B THE PRESSURE IS TO BE DISPLAYED ON GRAPHIC DISPLAY SCREENS AT THE MMI TERMINALS.
C THE SOFTWARE SHALL PROVIDE ADJUSTABLE THRESHOLDS FOR PRESSURE LEVEL WARNINGS AND ALARMS. THERE SHALL BE PROVISIONS FOR SIX INDEPENDENTLY ADJUSTABLE THRESHOLDS CONFIGURABLE AS WARNINGS OR ALARMS. THE CONTROL SYSTEM IS TO LOG ALL WARNINGS AND ALARMS.
D PRESSURE LEVEL ALARMS ARE TO BE ANNUNCIATED AT THE MMI
E CHLORINE LEVEL IPNPUT IS INPUT "4CHLOR"
F PRESSURE INPUT IS INPUT "4PRESS".
G THE RESEVOIR LEVEL TRANSDUCER INPUT LOOP (4-20mA) IS TO BE MONITORED BY THE PLC TO DETERMINE IF THE MINIMUM LOOP CURRENT IS PRESENT.
H THE RESEVOIR LEVEL, FILL RATE AND EMPTY RATE ARE TO BE DISPLAYED ON GRAPHIC SCREENS AT THE MMI TERMINALS.
I THE SOFTWARE SHALL PROVIDE ADJUSTABLE THRESHOLDS FOR RESEVOIR LEVEL WARNINGS AND ALARMS. THERE SHALL BE PROVISIONS FOR SIX INDEPENDENTLY ADJUSTABLE THRESHOLDS CONFIGURABLE AS WARNINGS OR ALARMS. THE CONTROL SYSTEM IS TO LOG ALL WARNINGS AND ALARMS.
J RESEVOIR LEVEL ALARMS ARE TO BE ANNUNCIATED AT THE MMI
K THE CONTROL PROGRAM SHALL CALCULATE THE RATE OF CHANGE IN THE RESEVOIR AND USE THIS VALUE AND THE RESEVOIR GEOMETRY TO CALCULATE THE TIME TO FILL OR EMPTY THE RESEVOIR
L RESEVOIR LEVEL IS MONITORED BY LEVEL SENSOR. INPUT "4LVL".
M THE CHLORINE TRANSDUCER INPUT LOOP (4-20mA) IS TO BE MONITORED BY THE PLC TO DETERMINE IF THE MINIMUM LOOP CURRENT IS PRESENT.
N THE CHLORINE IS TO BE DISPLAYED ON GRAPHIC DISPLAY SCREENS AT THE MMI TERMINALS.
O THE SOFTWARE SHALL PROVIDE ADJUSTABLE THRESHOLDS FOR CHLORINE LEVEL WARNINGS AND ALARMS. THERE SHALL BE PROVISIONS FOR SIX INDEPENDENTLY ADJUSTABLE THRESHOLDS CONFIGURABLE AS WARNINGS OR ALARMS. THE CONTROL SYSTEM IS TO LOG ALL WARNINGS AND ALARMS.
P CHLORINE LEVEL ALARMS ARE TO BE ANNUNCIATED AT THE MMI TERMINALS.
PRESSURE MEASUREMENT CONTROL LOGIC FLOW DIAGRAM
NO SCALE
CHLORINE MEASUREMENT CONTROL LOGIC FLOW DIAGRAM
NO SCALE
RESEVOIR LEVEL MEASUREMENT CONTROL LOGIC FLOW DIAGRAM
NO SCALE
REPAIR WATER PUMPING SYSTEM CONTROLS
ATLANTIC DIVISION
NORFOLK, VIRGINIA
AIR COMBAT COMMAND, LAKES FIELD
AZORES, PORTUGAL
E-25


REPAIR WATER PUMPING SYSTEM CONTROLS
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION
NORFOLK, VIRGINIA
AIR COMBAT COMMAND, LAJES FIELD
AZORES, PORTUGAL
Boomtn, Fretter & Associates, P.C.
Consulting Engineers
Virginia Beach, VA 23462
E-26
SLOT 3
NO SCALE
SLOT 2
NO SCALE
SLOT 6
NO SCALE
SLOT 5
NO SCALE
SLOT 4
NO SCALE
PLC 4 HARDWARE
NO SCALE
24VDC FROM I/O POWER SUPPLY
PUMP 1
PUMP 2
PUMP 3
PUMP 4
SPARE
FLOW METER
PRESS. METER
LEVEL METER
CHLOR. METER
FLOW XDCR
PRESSURE XDCR
LEVEL XDCR
RESIDUAL CHLORINE
(D) METER INTEGRAL WITH TRANSDUCER.
(E) METER MOUNTED IN PLC CABINET DOOR.
A 16 POINT DISCRETE INPUT MODULE
B 16 POINT DISCRETE OUTPUT MODULE
C 4 CHANNEL ANALOG INPUT MODULE
I/O POWER SUPPLY
24VDC PWR TO FLOW TRANSDUCER
LINE DRIVER
GOVERNMENT FURNISHED TELEPHONE LINES
PROCESSOR
RS-232 MODULE
PLC POWER SUPPLY