

LYNCHBURG CITY SCHOOLS

A TRADITION OF EXCELLENCE FOR ALL



LYNCHBURG CITY SCHOOLS

CHILLER REPLACEMENT PAUL MUNRO ELEMENTARY SCHOOL 4641 LOCKSVIEW ROAD LYNCHBURG, VA 24503

APRIL 22, 2016



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LYNCHBURG, VA 24501
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PROJECT NUMBER: 372-033

PROJECT CONTACTS

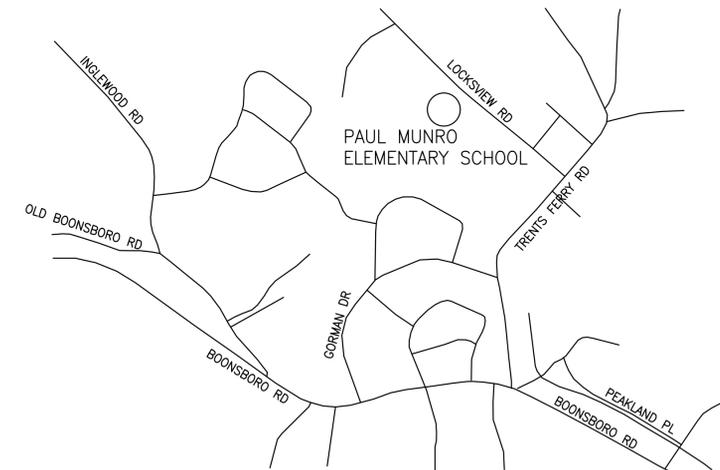
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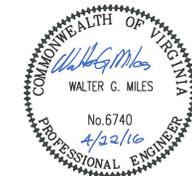
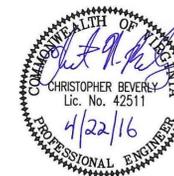
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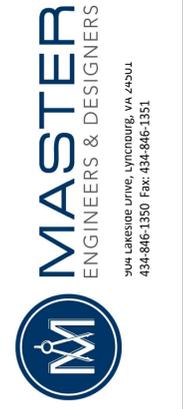
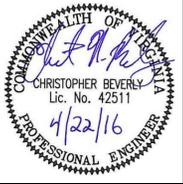
M1 LEGEND, NOTES, AND ABBREVIATIONS
M2 SITE PLAN
M3 CHILLER ENCLOSURE AND MER DEMOLITION PLAN
M4 CHILLER ENCLOSURE AND MER NEW WORK PLAN
M5 CONTROLS

E1 SPECS, LEGEND, ABBREVIATIONS & GENERAL ARRANGEMENT
E2 ONE LINE DIAGRAM & POWER SCHEDULES



VICINITY MAP

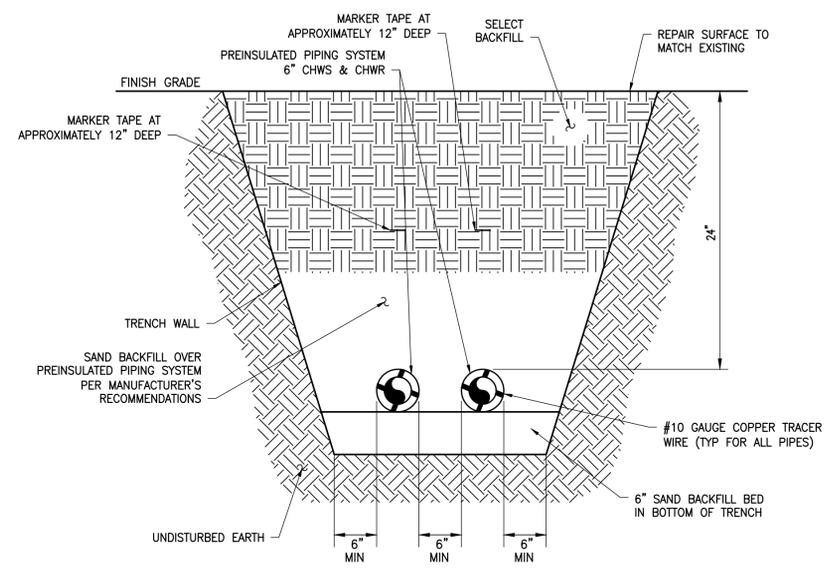




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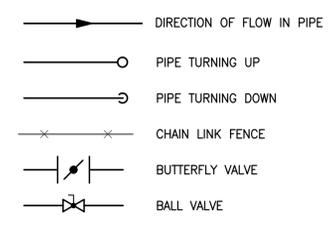
LEGEND, NOTES, AND ABBREVIATIONS

DATE ISSUED: 04/22/16
SCALE: NONE
JOB NO. 372-033
DESIGNED: CNB
DRAWN: RDC
CHECKED: CNB
APPROVED: CLS
DRAWING NO. M1
SHEET 1 OF 5
REVISION



SECTION - TRENCH DETAIL
NOT TO SCALE

LEGEND

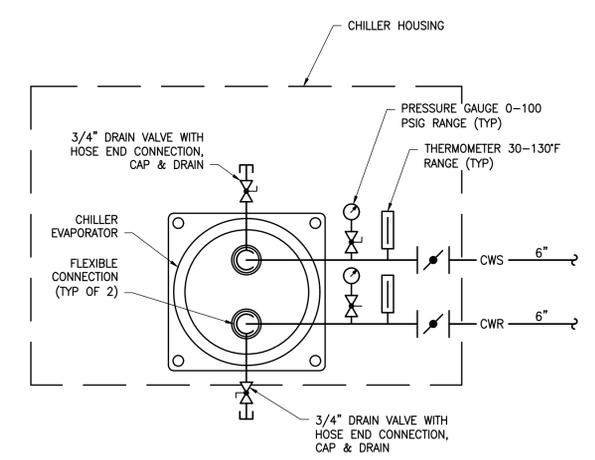


ABBREVIATIONS

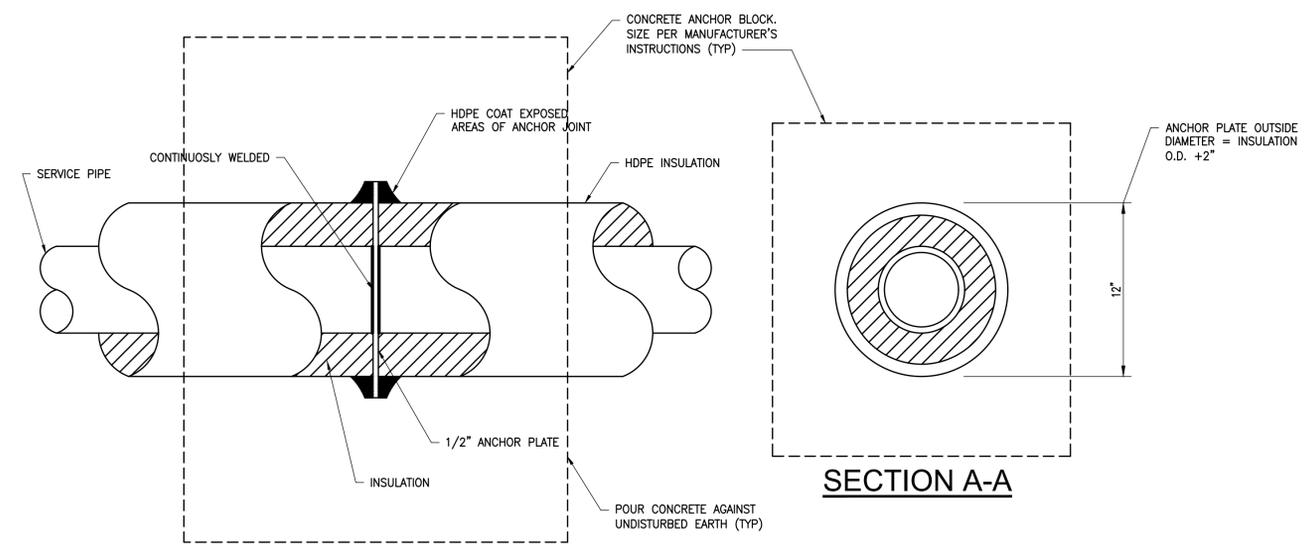
AAV	AUTOMATIC AIR VENT
ABV	ABOVE
BTUH	BRITISH THERMAL UNIT PER HOUR
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
DB	DRY BULB
DN	DOWN
(E)	EXISTING
EWT	ENTERING WATER TEMPERATURE
GPM	GALLONS PER MINUTE
HP	HORSEPOWER
LWT	LEAVING WATER TEMPERATURE
MAV	MANUAL AIR VENT
MAX.	MAXIMUM
MER	MECHANICAL EQUIPMENT ROOM
MIN.	MINIMUM
M/U	MAKEUP
OA	OUTSIDE AIR
PD	PRESSURE DROP
PSIG	POUNDS PER SQUARE INCH GAUGE
RPM	REVOLUTIONS PER MINUTE
TYP.	TYPICAL
VFD	VARIABLE FREQUENCY DRIVE
WPD	WATER PRESSURE DROP (FEET OF WATER)

GENERAL NOTES

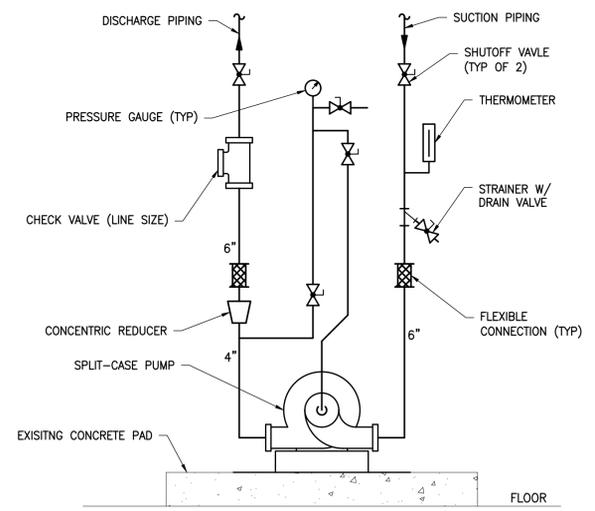
- WHERE SPACE IS LIMITED, ROUTES AND CLEARANCES AND INSTALLATION PROCEDURES FOR DUCTWORK, PIPING, VALVES, AND OTHER MECHANICAL EQUIPMENT SHALL BE VERIFIED AND COORDINATED WITH OTHER WORK BEFORE EQUIPMENT IS INSTALLED.
- ALL STRUCTURAL STEEL AND OTHER MATERIALS REQUIRED FOR OVERHEAD-SUSPENDED MECHANICAL EQUIPMENT SHALL BE PROVIDED BY CONTRACTOR. ALL NECESSARY REINFORCING IN BUILDING STRUCTURE SHALL BE PROVIDED BY CONTRACTOR.
- INSTALL MANUAL AIR VENTS AT ALL HIGH POINTS IN ALL CHILLED WATER PIPING; INSTALL DRAIN VALVES AT ALL NECESSARY LOW POINTS TO PERMIT DRAINING SYSTEM.
- FLEXIBLE PIPE SECTIONS SHALL BE INSTALLED IN CHILLED WATER CONNECTIONS TO CHILLER.
- IF ANY EQUIPMENT OTHER THAN THAT SHOWN OR SPECIFIED IS FURNISHED, THE CONTRACTOR SHALL VERIFY THAT THE EQUIPMENT CAN BE INSTALLED IN THE SPACE AVAILABLE, INCLUDING PASSAGE THROUGH DOORS AND ACCESS DOORS AND ACCESS TO THOSE PARTS OF THE EQUIPMENT REQUIRING SERVICE.
- OFFSET PIPING WHERE NECESSARY TO CLEAR OTHER WORK SUCH AS BEAMS, PIPES, ELECTRICAL EQUIPMENT, ETC., COORDINATE INSTALLATION WITH OTHER TRADES TO AVOID SPACE CONFLICTS.
- WHERE CONNECTIONS OR ALTERATIONS ARE MADE TO EXISTING PIPING, OR OTHER MECHANICAL EQUIPMENT, THE EXACT LOCATION AND CONFIGURATION OF THIS EQUIPMENT SHALL BE DETERMINED ON THE JOB SITE. ROUTE AND CLEARANCES FOR NEW PIPING, OR OTHER MECHANICAL EQUIPMENT CONNECTING TO EXISTING EQUIPMENT SHALL BE VERIFIED ON THE JOB SITE BEFORE FABRICATING ANY NEW EQUIPMENT.
- WHERE ANY PART OF BUILDING OR EXISTING EQUIPMENT IS CUT OR OTHERWISE DISFIGURED TO PERMIT INSTALLATION OF NEW EQUIPMENT OR RELOCATION OF EXISTING EQUIPMENT, THIS PART OF BUILDING OR EXISTING EQUIPMENT SHALL BE REPAIRED OR REPLACED TO MATCH EXISTING.
- BALANCE REPORT SHALL ACCOMPANY A SET OF AS-BUILT PLANS INDICATING EXACT TO-SCALE LOCATIONS AND FINAL BALANCE FLOW RATES. MAINTAIN A MINIMUM OF ONE INTACT SET OF PROJECT PLANS AND SPECIFICATIONS AT JOB SITE MARKED TO SHOW ALL DEVIATIONS PERMITTED DURING CONSTRUCTION AS THE WORK IS INSTALLED. ALL MARKS SHALL BE RED IN COLOR, COMPLETE, CLEAR AND LEGIBLE.



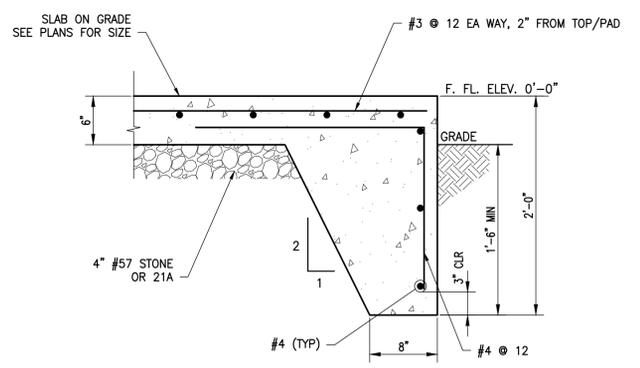
CHILLER PIPING DETAIL
SCALE: NONE



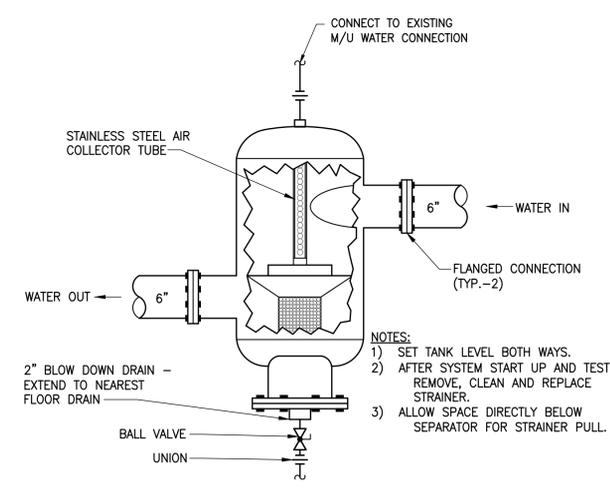
UNDERGROUND CHILLED WATER SYSTEM ANCHOR DETAIL
NOT TO SCALE
NOTE: THIS DETAIL DOES NOT APPLY TO ANCHORS AT PIPE ELBOWS



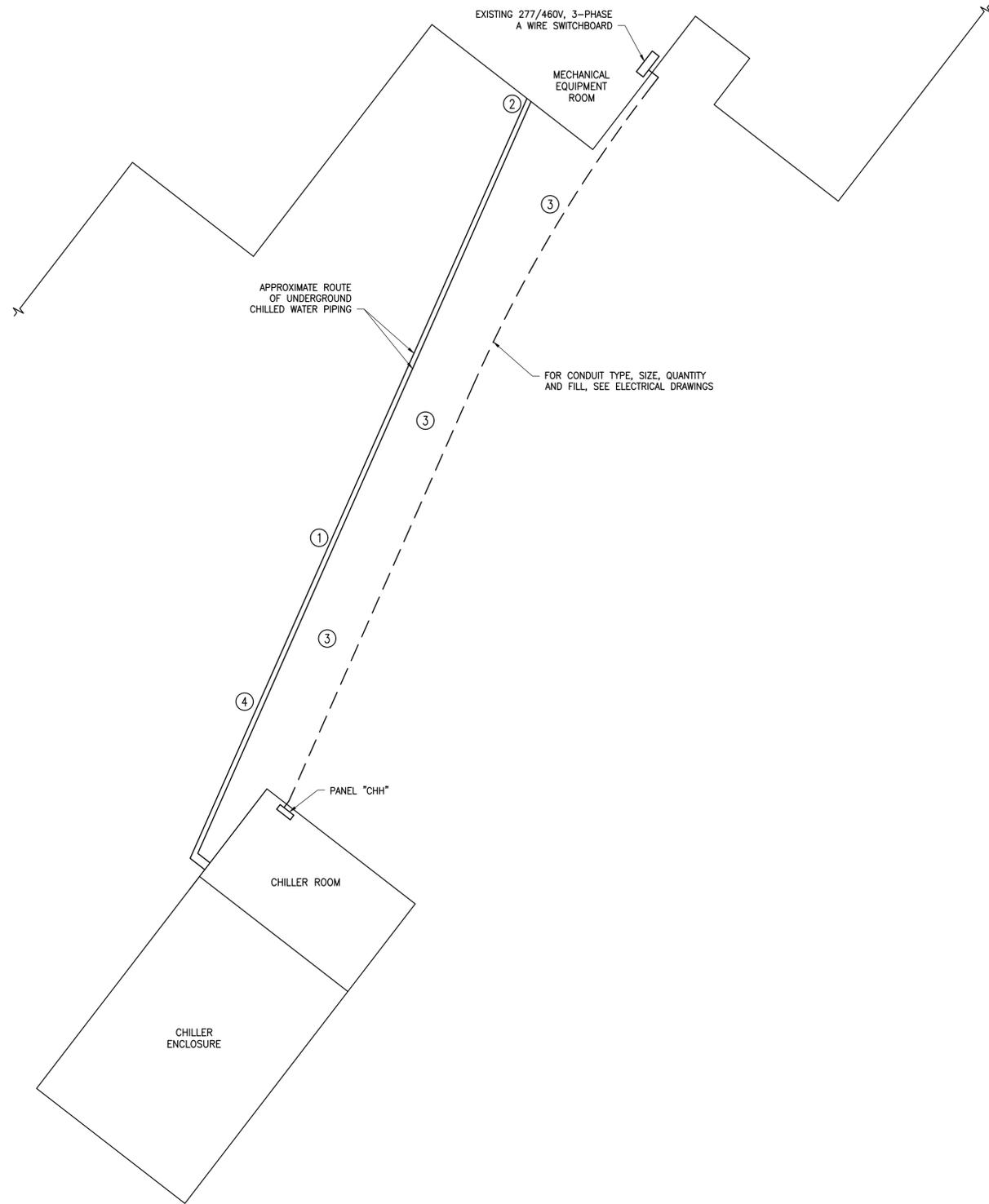
PUMP DETAIL
SCALE: NONE



EQUIPMENT DOWNTURN PAD DETAIL
SCALE: NONE



TANGENTIAL AIR SEPARATOR DETAIL
SCALE: NONE



EXISTING 277/460V, 3-PHASE
A WIRE SWITCHBOARD

MECHANICAL
EQUIPMENT
ROOM

APPROXIMATE ROUTE
OF UNDERGROUND
CHILLED WATER PIPING

FOR CONDUIT TYPE, SIZE, QUANTITY
AND FILL, SEE ELECTRICAL DRAWINGS

PANEL "CHH"

CHILLER ROOM

CHILLER
ENCLOSURE

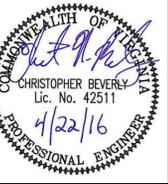
SITE PLAN
SCALE: 1/8"=1'-0"
NORTH

PLAN NOTES

- ① DEMOLISH EXISTING CHILLED WATER PIPING AND ROUTE NEW PRE-INSULATED CHILLED WATER PIPING IN THE EXISTING ROUTING.
- ② SAW CUT EXISTING SIDEWALK AND REPAIR TO MATCH EXISTING.
- ③ REPAIR ALL DISTURBED PAVING AND PARKING AREA TO MATCH EXISTING.
- ④ COORDINATE INSTALLATION OF ANCHORS AND THRUST BLOCKS WITH PRE-INSULATED PIPING VENDOR. PRE-INSULATED PIPING VENDOR SHALL DESIGN ANCHORS AND THRUST BLOCKS BASED ON A TEMPERATURE RISE OF 100°F. PROVIDE SUBMITTAL DATA FOR ANCHORS AND THRUST BLOCKS WITH PIPING SUBMITTALS.



REVISIONS:

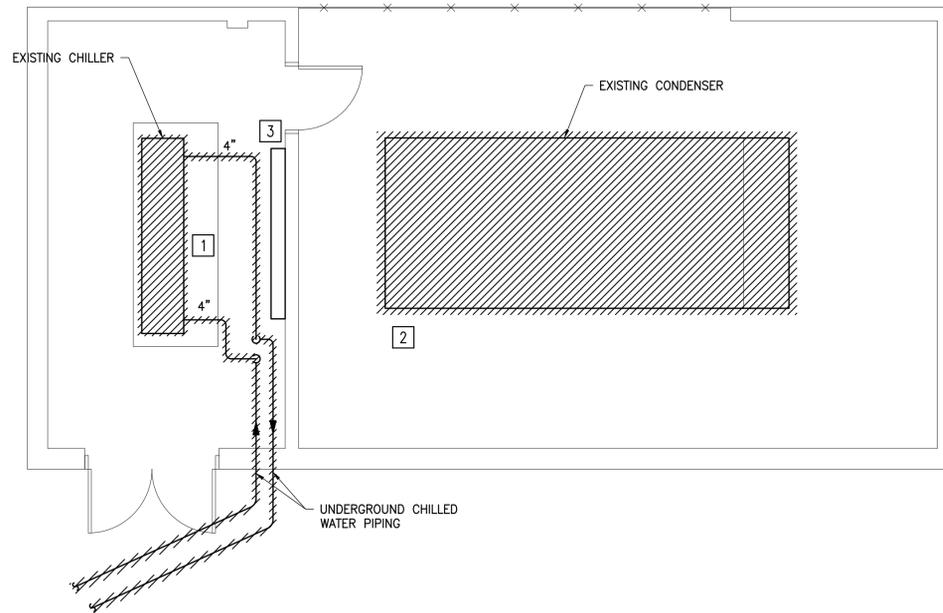


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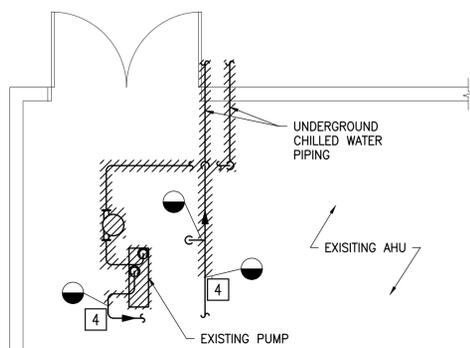
SITE PLAN

DATE ISSUED: 04/22/16
SCALE: 1/8"=1'-0"
JOB. NO. 372-033
DESIGNED: CNB
DRAWN: RDC
CHECKED: CNB
APPROVED: CLS

DRAWING NO.
M2
SHEET 2 OF 5
REVISION



CHILLER ENCLOSURE DEMOLITION PLAN
 SCALE: 1/4"=1'-0"
 NORTH



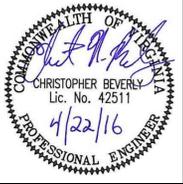
MER DEMOLITION PLAN
 SCALE: 1/4"=1'-0"
 NORTH

PLAN NOTES

- 1 DEMOLISH EXISTING CHILLER, CONDENSER, REFRIGERANT PIPING, AND CHILLED WATER PIPING.
- 2 DEMOLISH EXISTING CONDENSER PAD.
- 3 RELOCATE EXISTING BASEBOARD ELECTRIC HEATER, AS REQUIRED, TO ALLOW CHILLED WATER PIPING INSTALLATION.
- 4 PRIOR TO DEMOLITION, THE CONTRACTOR SHALL MEASURE AND RECORD THE CHILLED WATER PRESSURE DIFFERENTIAL WITH THE EXISTING CHILLED WATER PUMP IN OPERATION.



REVISIONS:



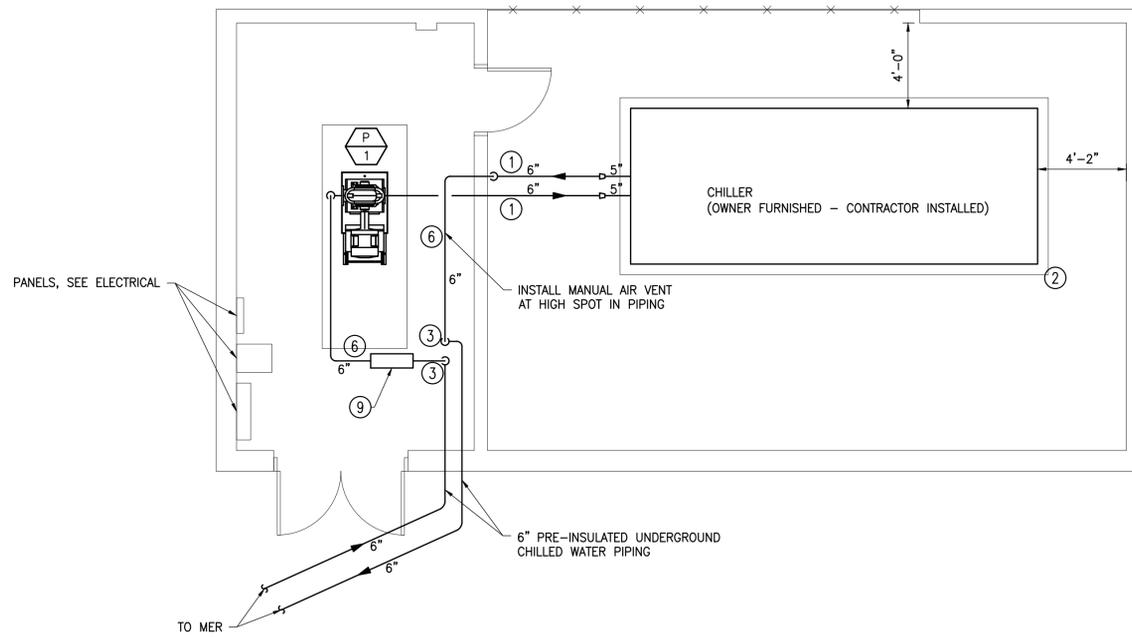
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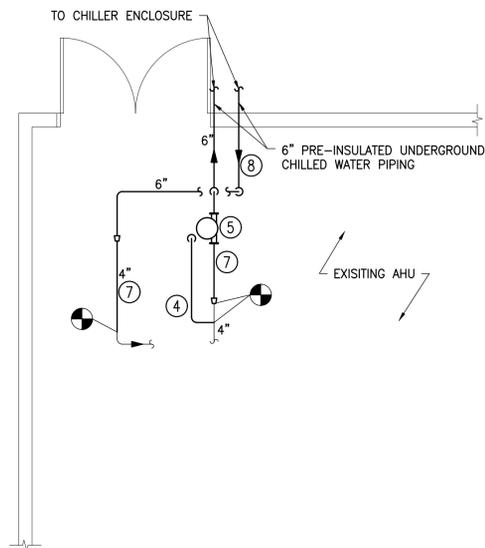
**CHILLER ENCLOSURE
 AND MER DEMOLITION
 PLAN**

DATE ISSUED: 04/22/16
 SCALE: 1/4"=1'-0"
 JOB. NO. 372-033
 DESIGNED: CNB
 DRAWN: RDC
 CHECKED: CNB
 APPROVED: CLS

DRAWING NO.
M3
 SHEET 3 OF 5
 REVISION



CHILLER ENCLOSURE NEW WORK PLAN
 SCALE: 1/4"=1'-0"
 NORTH



MER NEW WORK PLAN
 SCALE: 1/4"=1'-0"
 NORTH

PLAN NOTES

- ① INSULATE AND INSTALL HEAT TRACE ON CHILLED WATER PIPING INSTALLED OUTDOORS.
- ② INSTALL CHILLER ON NEW EQUIPMENT PAD. MINIMUM 6" REVEAL ALL SIDES. SEE DETAIL ON SHEET M1.
- ③ INSTALL ISOLATION VALVES IN VERTICAL.
- ④ RELOCATE AHU RETURN TAP AS INDICATED.
- ⑤ RECONNECT MAKEUP WATER CONNECTION TO NEW AIR SEPARATOR.
- ⑥ SUPPORT CHILLED WATER PIPING FROM THE CONCRETE SLAB ON GRADE. DO NOT SUPPORT PIPING FROM THE ROOF STRUCTURE.
- ⑦ INSTALL PRESSURE DIFFERENTIAL SENSOR AT LOCATIONS INDICATED IN NEW PIPING.
- ⑧ PATCH AND REPAIR FLOOR AT PIPING TO MATCH EXISTING.
- ⑨ 6" IN-LINE AIR PURGER EQUAL TO WESSELS MODEL AP-106 WITH AUTOMATIC AIR VENT.

PACKAGED AIR-COOLED CHILLER SCHEDULE

MARK	MODEL	NOMINAL TONS	TONS	EWT/LWT, Deg F	GPM	WTR Pd Ft	V/Ph/Hz	KW	REMARKS
CHILLER	RTAE150	150	143.8	54.0/44.0	343.7	14.1	480/3/60	151.9	1,2,3,4

- REMARKS:
1. MODEL NUMBER BASED ON TRANE. (REFER TO PROJECT MANUAL FOR ADDITIONAL REQUIREMENTS).
 2. LWT BASED ON 95°F AMBIENT TEMPERATURE.
 3. CHILLER SHALL BE OWNER-FURNISHED, CONTRACTOR-INSTALLED
 4. BALANCE CHILLED WATER FLOW RATE AS INDICATED ON SHEET M5.

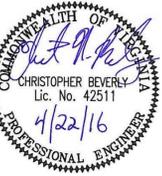
PUMP SCHEDULE

MARK	DUTY	SERIES	MODEL	RPM	HP	GPM	HEAD,Ft	V/Ph/Hz	REMARKS
P-1	CHILLED WATER	HSC ³	4x6x14L	1170	7.5	345	58	460/3/60	1,2,3

- REMARKS:
1. MODEL NUMBER BASED ON BELL AND GOSSETT.
 2. PUMP MOTOR SHALL BE INVERTER-DUTY RATED FOR USE WITH VFD.
 3. BALANCE PUMP FLOW AS INDICATED ON SHEET M5.



REVISIONS:



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 PAUL MUNRO ELEM. SCHOOL
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CHILLER ENCLOSURE
 AND MER NEW WORK
 PLAN

DATE ISSUED: 04/22/16

SCALE: 1/4"=1'-0"

JOB. NO. 372-033

DESIGNED: CNB

DRAWN: RDC

CHECKED: CNB

APPROVED: CLS

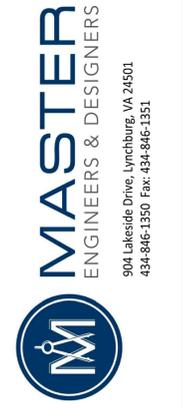
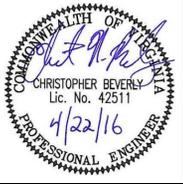
DRAWING NO.

M4

SHEET 4 OF 5

REVISION

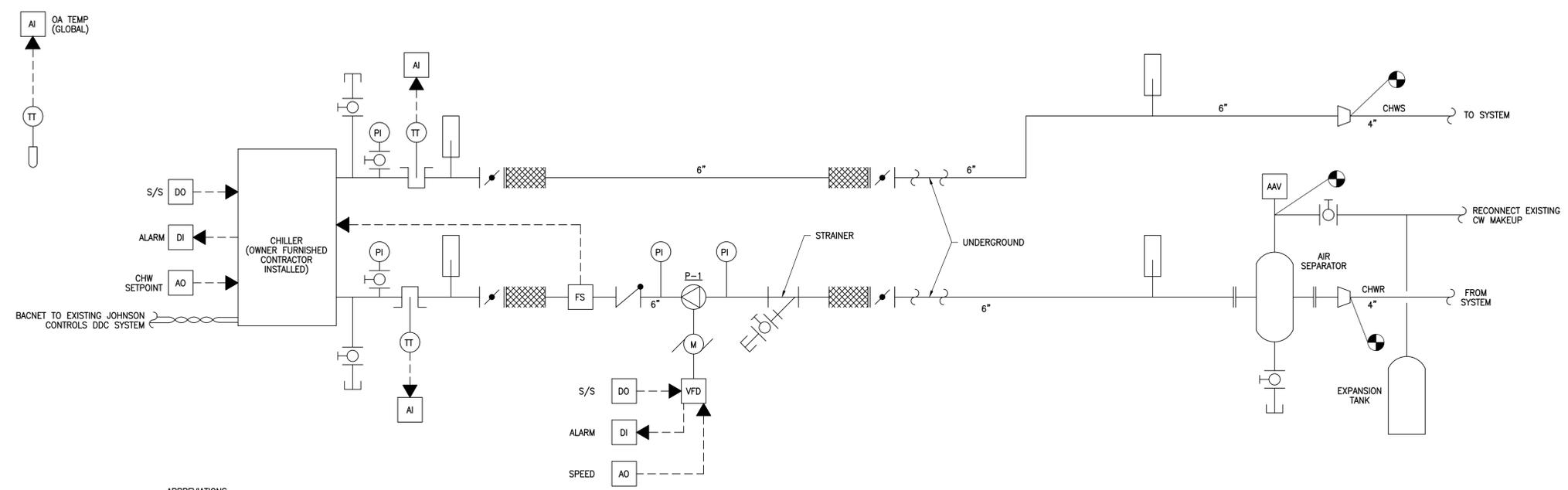
REVISIONS:



LYNCHBURG CITY SCHOOLS
CHILLER REPLACEMENT
PAUL MUNRO ELEM. SCHOOL
LYNCHBURG, VA

CONTROLS

DATE ISSUED: 04/22/16
SCALE: NONE
JOB. NO. 372-033
DESIGNED: CNB
DRAWN: RDC
CHECKED: CNB
APPROVED: CLS
DRAWING NO. M5
SHEET 5 OF 5
REVISION



CONTROLS LEGEND

SYMBOLS	ABBREVIATIONS
AI	ANALOG INPUT (0-10, 1-5V, 4-20 mA OR THE LIKE)
AO	ANALOG OUTPUT (0-10, 1-5V, 4-20 mA OR THE LIKE)
DI	DIGITAL INPUT (2-STATE, ON/OFF)
DO	DIGITAL OUTPUT (2-STATE, ON/OFF)
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
PI	PRESSURE INDICATOR
PT	PRESSURE TRANSMITTER
JS	MOTOR STARTER
[Symbol]	ELECTRIC ACTUATOR
[Symbol]	BALL VALVE
[Symbol]	BUTTERFLY VALVE
[Symbol]	CHECK VALVE
AAV	AUTOMATIC AIR VENT
FS	FLOW SWITCH
VFD	VARIABLE FREQUENCY DRIVE
M	MOTOR
TT	TEMPERATURE TRANSMITTER
[Symbol]	THERMOMETER
[Symbol]	FLEX CONNECTOR
[Symbol]	HOSE BIB CONNECTION WITH CAP AND CHAIN
AAV (ADJ)	AUTOMATIC AIR VENT ADJUSTABLE
ASC	ADJUSTABLE APPLICATION SPECIFIC CONTROLLER
DEG. F	DEGREES FAHRENHEIT
S/S	START/STOP
TEMP	TEMPERATURE
TDV	TRIPLE DUTY VALVE

CHILLED WATER CONTROLS
NOT TO SCALE

SEQUENCE OF OPERATION

THE CHILLED WATER SYSTEM SHALL BE CONTROLLED BY AND ALL CONTROL FUNCTIONS INDICATED IN THIS SEQUENCE OF OPERATION SHALL BE ACCOMPLISHED BY A JOHNSON CONTROLS APPLICATION SPECIFIC CONTROLLER WHICH IS TO BE CONNECTED TO THE OWNER'S EXISTING JOHNSON CONTROLS DDC CONTROL SYSTEM. COMMUNICATIONS POINTS ARE LISTED AT THE END OF THIS SEQUENCE OF OPERATION.

THE ASC SHALL ENABLE THE CHILLED WATER PLANT WHEN THE OUTSIDE AIR TEMPERATURE IS GREATER THAN 58 DEG F (ADJ). WHEN THE CHILLED WATER PLANT IS ENABLED, THE ASC SHALL START CHILLED WATER PUMP P-1 AT MINIMUM SPEED. THE ASC SHALL MODULATE THE SPEED OF PUMP TO MAINTAIN THE CHILLED WATER SYSTEM DIFFERENTIAL PRESSURE TO THE CHILLED WATER SYSTEM DIFFERENTIAL SETPOINT. DURING BALANCING, THE TAB CONTRACTOR SHALL ESTABLISH THE PUMP SPEED AND REQUIRED PRESSURE DIFFERENTIAL SETPOINT BASED ON THE EXISTING PUMP DATA RECORDED PRIOR TO DEMOLITION. IF THE VFD FOR PUMP SENSES AN ALARM CONDITION, PUMP P-1 SHALL BE DISABLED, AND AN ALARM SHALL BE ANNUNCIATED AT THE OPERATOR'S WORKSTATION. WHEN THE OUTSIDE AIR TEMPERATURE FALLS BELOW 50 DEG F (ADJ), THE CHILLED WATER PLANT SHALL BE DISABLED. POINTS IN THE ASC SHALL BE INCLUDED FOR A FUTURE LAG PUMP.

WHEN THE LEAVING CHILLED WATER TEMPERATURE RISES ABOVE THE LEAVING CHILLED WATER TEMPERATURE SETPOINT PLUS A DIFFERENTIAL OF 2 DEGREES (ADJ), THE ASC SHALL ENABLE THE CHILLER.

WHEN ENABLED, THE CHILLER SHALL START AND OPERATE ON ITS OWN INTERNAL CONTROLS AND SAFETIES. WHENEVER AN ALARM IS SENSED BY THE CHILLER, THE CHILLER SHALL SHUT DOWN AND AN ALARM SHALL BE ANNUNCIATED AT THE OPERATOR'S WORKSTATION.

THE CHILLER SHALL MODULATE COMPRESSOR SPEED AND ENABLE STAGES OF CONDENSER FANS AS REQUIRED BY THE CHILLER CONTROL PANEL.

ADDITIONAL SOFTWARE POINTS FROM THE CHILLER REQUIRED (TO BE AVAILABLE AT THE OPERATORS WORKSTATION):

EVAPORATOR PRESSURE (PER CIRCUIT)	AI
CONDENSER PRESSURE (PER CIRCUIT)	AI
EVAPORATOR REFRIG. TEMPERATURE (PER CIRCUIT)	AI
CONDENSER REFRIG. TEMPERATURE (PER CIRCUIT)	AI
EVAPORATOR ENTERING WATER TEMPERATURE	AI
EVAPORATOR LEAVING WATER TEMPERATURE	AI
ACTIVE CHILLED WATER SETPOINT	AI
COMPRESSOR STATUS (PER COMPRESSOR)	DI
% OF FULL LOAD	AI
FLOW SWITCH STATUS	DI

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ELECTRICAL LEGEND

—————	CONDUIT RUN EXPOSED
-----	CONDUIT RUN IN OR BELOW FLOOR SLAB OR BELOW GRADE, AS APPLICABLE
—————>	HOMERUN
□	SAFETY SWITCH, NON-FUSED
□	SAFETY SWITCH, FUSIBLE
□	PANLEBOARD
Ⓜ	MOTOR
Ⓜ	VARIABLE FREQUENCY DRIVE
Ⓜ	RECEPTACLE, NEMA 5-20R
Ⓜ	GFI RECEPTACLE, NEMA 5-20R WITH CAST METAL "WHILE IN USE" COVER.

ABBREVIATIONS

AF	AMPERE FRAME
AF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AMPS	AMPERES
AT	AMPERE TRIP
BCSD	BARE COPPER SOFT DRAWN
C	CONDUIT
CONN	CONNECTED
EGC	EQUIPMENT GROUNDING CONDUCTOR
FPEM	FUSE PER EQUIPMENT MANUFACTURERS RECOMMENDATIONS
GEC	GROUNDING ELECTRODE CONDUCTOR
GFI	GROUND FAULT INTERRUPTER
GND	GROUND
HP	HORSEPOWER
HVAC	HEATING, VENTILATION & AIR CONDITIONING
KCMIL	THOUSAND CIRCULAR MILS
KVA	KILOVOLT-AMPERES
MCCB	MOLDED CASE CIRCUIT BREAKER
N, NEUT	NEUTRAL
∅	PHASE
P	POLE
PVC	POLYVINYL CHLORIDE
RMS	ROOT MEAN SQUARE
RSC	RIGID STEEL CONDUIT
SYM	SYMMETRICAL
V	VOLTS
WP	WEATHERPROOF

NOTES (DRAWING NO. E1)

1. WIRING TO EQUIPMENT SHALL BE PER ELECTRICAL ONE LINE DIAGRAM. DETERMINE ROUTING IN FIELD.
2. LITHONIA FEM4-4L-35-IMAFL

ELECTRICAL SPECIFICATIONS

PART 1 - GENERAL

- 1.1 PROVIDE ALL NECESSARY ITEMS FOR THE COMPLETE INSTALLATION OF A PROPERLY OPERATING ELECTRICAL SYSTEM AS SPECIFIED HEREIN, BASED ON THESE DRAWINGS, ALL APPLICABLE CODES, STANDARDS AND THE INTENDED PURPOSE OF THE OWNER.
- 1.2 COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES AND ALL REQUIREMENTS OF THE CURRENT NATIONAL ELECTRICAL CODE.
- 1.3 FURNISH ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES REQUIRED TO COMPLETE AND LEAVE READY FOR OPERATION ALL ELECTRICAL SYSTEMS AS SHOWN ON THESE DRAWINGS AND AS REQUIRED, INCLUDING THE COMPLETE COORDINATION OF ALL PORTIONS OF ELECTRICAL WORK WITH THAT OF OTHER TRADES.
- 1.4 FURNISH NEW UL LISTED, WHERE APPLICABLE, MATERIALS AND EQUIPMENT.
- 1.5 VISIT THE SITE TO BECOME KNOWLEDGEABLE ABOUT THE LOCATION, ACCESSIBILITY AND GENERAL CHARACTER OF THE SITE OR BUILDING, AND THE CHARACTER AND EXTENT OF EXISTING WORK WITHIN OR ADJACENT TO THE SITE. CLAIMS, AS A RESULT OF FAILURE TO DO SO, WILL NOT BE CONSIDERED BY THE OWNER.
- 1.6 ARRANGE EQUIPMENT AS SHOWN ON THE DRAWINGS. MAKE DEVIATIONS ONLY WHERE NECESSARY TO AVOID INTERFERENCE. CHECK EQUIPMENT SIZE AGAINST AVAILABLE SPACE PRIOR TO SHIPMENT TO AVOID INTERFERENCE.
- 1.7 MAKE INDICATED REVISIONS AND ADDITIONS TO EXISTING FACILITIES AND EQUIPMENT INCLUDING ALL DEMOLITION AND REWORK OF EXISTING SYSTEMS.
- 1.8 COORDINATE ELECTRICAL OUTAGES WITH THE OWNER TO FACILITATE REWORKING OF EXISTING SYSTEM.
- 1.9 PROVIDE TESTING TO CONFIRM PROPER OPERATION OF ALL ELECTRICAL SYSTEMS, REPAIR OR REPLACE, AT NO EXPENSE TO OWNER, MATERIAL OR EQUIPMENT FAILING TESTS.
- 1.10 INSTRUCT THE OWNER'S REPRESENTATIVES IN THE PROPER OPERATION AND CONTROL OF ALL EQUIPMENT INSTALLED UNDER THIS CONTRACT.
- 1.11 GUARANTEE MATERIALS AND WORKMANSHIP AGAINST DEFECTS. REPLACE, AT NO EXPENSE TO OWNER, WORK OR MATERIAL THAT IS SHOWN TO BE DEFECTIVE WITHIN A PERIOD OF ONE (1) YEAR AFTER FINAL ACCEPTANCE OF WORK.
- 1.12 SUBMIT SIX (6) COPIES OF SHOP DRAWINGS FOR THE FOLLOWING:
 - A. SAFETY SWITCHES
 - B. CIRCUIT BREAKERS
 - C. PANELBOARDS
 - D. TRANSFORMERS
- 1.13 SUBMISSION OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR OF PROVIDING ELECTRICAL EQUIPMENT AND MATERIALS WITH THE PROPER ELECTRICAL CHARACTERISTICS AND FEATURES AS SPECIFIED HEREIN AND ON THE DRAWINGS.
- 1.14 SUBMIT CONSTRUCTION RECORD DRAWINGS THAT REFLECT ALL ADJUSTMENTS MADE TO THESE DRAWINGS. PROVIDE CLEAR, CLEAN MARK-UPS OF THE RECORD CONDITIONS SO THAT THE ORIGINAL DRAWINGS CAN BE UPDATED.
- 1.15 SUBMIT THREE (3) COPIES OF OPERATION AND MAINTENANCE MANUALS COVERING ITEMS AND EQUIPMENT INCLUDED IN THIS WORK.

PART 2 - PRODUCTS

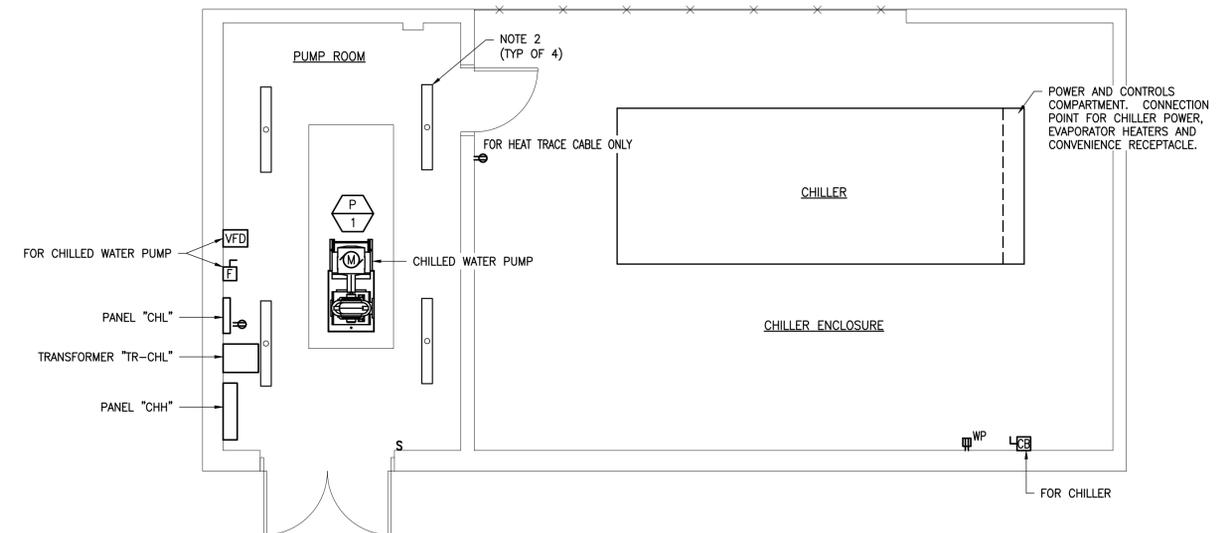
- 2.1 FURNISH AND INSTALL ALL ELECTRICAL MATERIAL.
- 2.2 NAMEPLATES ON ALL PANELS, DISCONNECT SWITCHES, ETC., MADE OF BLACK LAMINATED PHENOLIC WITH WHITE LETTERS. FASTENERS SHALL BE SCREWS.
- 2.3 TYPED DIRECTORIES FOR ALL PANELS TO MATCH RECORD DRAWINGS.

PART 3 - EXECUTION

- 2.4 RACEWAYS
 - A. ABOVE GRADE: GALVANIZED, RIGID STEEL CONDUIT (RSC)
 - B. BELOW GRADE: PVC 40 DB
 - C. FLEXIBLE CONDUIT FOR ALL FINAL CONNECTIONS TO MOTORS AND EQUIPMENT SUBJECT TO VIBRATION. USE LIQUIDTIGHT FLEXIBLE CONDUIT.
- 2.5 WIRING
 - A. CONDUCTOR: COPPER
 - B. INSULATION:
 1. #8 AWG AND SMALLER TYPE THHN/THWN
 2. LARGER THAN #8 AWG, TYPE XHHW RATED FOR 90 DEG. C
 3. VOLTAGE RATING: 600 VOLTS
- 2.6 GROUND ALL METAL RACEWAYS AND ENCLOSURES. PROVIDE EQUIPMENT GROUNDING CONDUCTORS IN ALL RACEWAYS.
- 2.7 HANGERS, BOLTS, CLAMPS, STEEL ITEMS, ANCHORS, SLEEVES, CHASES, SUPPORTS, FLASHING AND SIMILAR ITEMS REQUIRED FOR THE PROPER INSTALLATION OF ALL ELECTRICAL WORK.
- 2.8 SAFETY SWITCHES SHALL BE THE ENCLOSED HEAVY DUTY TYPE (HD) WITH "QUICK-MAKE" "QUICK-BREAK" MECHANISM AND EXTERNAL PADLOCK ABLE OPERATING HANDLE. THEY SHALL BE FUSIBLE OR NON-FUSIBLE, TWO, THREE, OR FOUR-POLE AS INDICATED. MANUFACTURER SHALL BE SQUARE D, CUTLER-HAMMER, GENERAL ELECTRIC, OR SIEMENS.
- 2.9 PANELBOARDS AND MOLDED CASE CIRCUIT BREAKERS (MCCB) SHALL HAVE RATINGS AS INDICATED. BUS BARS SHALL BE COPPER. MCCB'S SHALL BE BOLT ON. LOAD CENTERS ARE NOT PERMITTED. MANUFACTURER SHALL BE SQUARE D, CUTLER-HAMMER, GENERAL ELECTRIC, OR SIEMENS.
- 2.10 NEMA 1 ENCLOSURES INDOORS AND NEMA 3R ENCLOSURES OUTDOORS UNLESS OTHERWISE INDICATED ON DRAWINGS.

PART 3 - EXECUTION

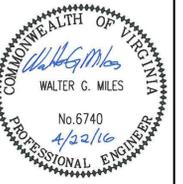
- 3.1 PROVIDE EQUIPMENT CONNECTIONS COMPLETE WITH SWITCHES, WIRING DEVICES, CONTROL DEVICES, PROTECTIVE DEVICES, CONDUIT, WIRE AND OTHER ACCESSORIES. ALL EQUIPMENT AND CONNECTIONS SHALL BE AS RECOMMENDED BY THE MANUFACTURER.
- 3.2 COORDINATE THE VOLTAGE REQUIREMENTS OF ALL EQUIPMENT TO BE INSTALLED, REGARDLESS OF THE SUPPLIER, WITH THE UTILIZATION AND / OR DISTRIBUTION VOLTAGES SHOWN ON THE ELECTRICAL DRAWINGS. REPAIR OR REPLACE, AT NO EXPENSE TO THE OWNER, EQUIPMENT SUSTAINING DAMAGE BECAUSE OF IMPROPER CONNECTIONS.
- 3.3 WHEN EQUIPMENT IS SUPPLIED WITH OTHER ELECTRICAL REQUIREMENTS AT VARIANCE WITH THOSE SPECIFIED OR SHOWN ON THE DRAWINGS, PROVIDE ASSOCIATED ELECTRICAL DEVICES AND CIRCUITRY OF THE CORRECT SIZES AND RATINGS.
- 3.4 INSTALL RACEWAYS IN ACCORDANCE WITH NEC.
- 3.5 LABEL AND IDENTIFY ALL PANELBOARDS, DISCONNECTS, STARTERS, PULL BOXES, FEEDERS, CIRCUITS, AND SIMILAR ITEMS.
- 3.6 PROVIDE ALL CUTTING, DRILLING AND PATCHING OF THE BUILDING STRUCTURE AS REQUIRED FOR THE WORK AS INDICATED. PATCHING SHALL MATCH EXISTING SURROUNDING AREA.



CHILLER ENCLOSURE GENERAL ARRANGEMENT
SCALE: 1/4" = 1'-0"
NORTH



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LYNCHBURG CITY
SCHOOLS
CHILLER REPLACEMENT
PAUL MUNRO ELEM. SCHOOL
LYNCHBURG, VA

SPECS, LEGEND, &
ABBREVIATIONS &
GENERAL
ARRANGEMENT

DATE ISSUED: 04/22/16
SCALE: AS NOTED
JOB. NO. 372-033
DESIGNED: WGM
DRAWN: JHR
CHECKED: WGM
APPROVED: WGM

DRAWING NO.
E1
SHEET 1 OF 2
REVISION

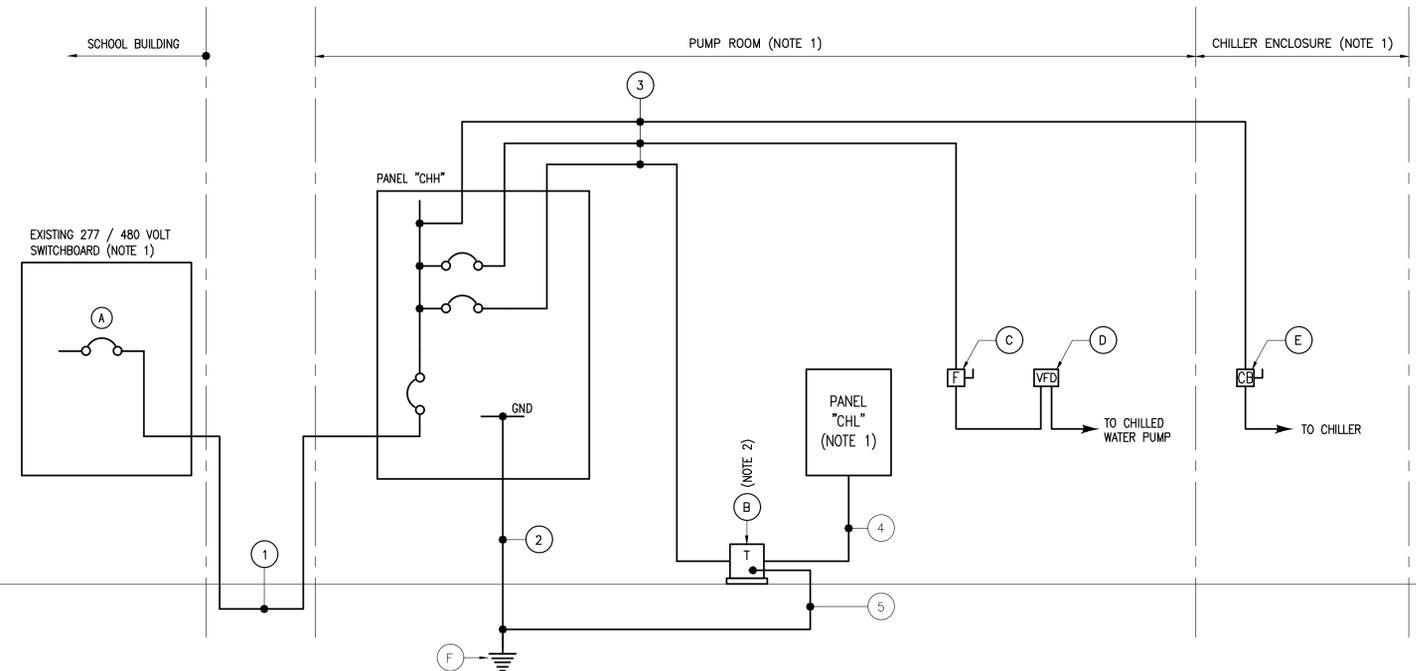
4/21/2016 4:08 PM P:\372 Lynchburg Public Schools\033 - Paul Munro - Replacement Chiller\Drawings\Electrical\E2_372-033.dwg

ONE LINE DIAGRAM KEY

- (A) 400 AF, 3P, 400 AT MCCB. INSTALL IN EXISTING SWITCHBOARD IN A PREPARED SPACE. PROVIDE ACCESSORY MOUNTING HARDWARE AND MCCB-TO-BUS BAR CONDUCTIVE STRAPS.
- (B) TRANSFORMER "TR-CHL", 15 KVA, 3-PHASE, 480 VOLT PRIMARY, 120 / 208 VOLT SECONDARY DRY TYPE TRANSFORMER. SQUARE D CAT. NO. EE15T3H, OR EQUAL.
- (C) 3-POLE, FUSIBLE SAFETY SWITCH. PROVIDE CLASS R FUSES AS RECOMMENDED BY CHILLED WATER PUMP SUPPLIER.
- (D) VFD BY MECHANICAL CONTRACTOR
- (E) 400 AF, 3P, 400 AT MCCB
- (F) 3/4" X 10'-0" COPPER CLAD GROUND ROD.
- (1) 3 #500 KCMIL $\frac{1}{2}$ " #2 EGC - 4" PVC BELOW GRADE, RSC ABOVE GRADE. FOR ROUTE, SEE MECHANICAL DRAWINGS.
- (2) 1 #1/0 BCSD GEC - 1" PVC.
- (3) FOR CONDUIT TYPE, SIZE, QUANTITY AND FILL, SEE ASSOCIATED PANEL SCHEDULE.
- (4) 4 #6 & 1 #10 EGC - 1" RSC.
- (5) 1 #8 BCSD GEC - 3/4" PVC.

NOTES (DRAWING NO. E2)

1. FOR LOCATIONS, SEE MECHANICAL DRAWINGS.
2. BOND SECONDARY NEUTRAL TO GROUND.

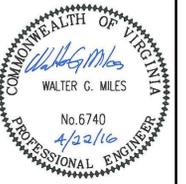


PANEL "CHH" SCHEDULE													
. PANELBOARD CHARACTERISTICS:													
VOLTS:		480		SOLID NEUTRAL		GROUND BAR		MAIN BREAKER: 600 AF, 3P, 600 AT					
PHASES:		3		MINIMUM SHORT CIRCUIT RATING:		65,000 RMS SYM AMPS							
WIRES:		4											
CKT. NO.	POLE NO.	DESCRIPTION	CONN. KVA	CONN. AMPS			BREAKER			NO. & WIRE SIZE			CONDUIT SIZE
				A	B	C	P	AF	AT	PHASE	NEUT.	EGC	
	1	SPACE & BUS ONLY					1	100					
	2	"					"	"					
	3	"					"	"					
	4	"					"	"					
	5	"					"	"					
	6	"					"	"					
	7	"					"	"					
8	8	PANEL "CHL"	5.60	5.1	6.5	8.7	3	100	30	#10	---	#12	3/4" RSC
	9	(VA TRANSFORMER "TR-CHL")								#10			
	10	"		10.5						#12			
11	11	CHILLED WATER PUMP (7 1/2 HP)	8.75		10.5		3	100	25	#12	---	#12	3/4" RSC
	12	"								#12			
	13	"		269.7						#350			
14	14	SUBFEED LUGS FOR CHILLER	223.88		269.7		3	400	---	#350	---	#2	3" RSC
	15	"			269.7					#350			
TOTALS			238.23	285.3	286.8	288.9							

PANEL "CHL" SCHEDULE													
. PANELBOARD CHARACTERISTICS:													
VOLTS:		120 / 208		SOLID NEUTRAL		GROUND BAR		MAIN BREAKER: 100 AF, 3P, 60 AT					
PHASES:		3		MINIMUM SHORT CIRCUIT RATING:		10,000 RMS SYM AMPS							
WIRES:		4											
CKT. NO.	POLE NO.	DESCRIPTION	CONN. KVA	CONN. AMPS			BREAKER			NO. & WIRE SIZE			CONDUIT SIZE
				A	B	C	P	AF	AT	PHASE	NEUT.	EGC	
1	1	LIGHTS: PUMP ROOM	0.60	5.0			1	100	20	#12	#12	#12	3/4" RSC
3	3	REC: PUMP ROOM	1.20		10.0		1	100	20	#12	#12	#12	3/4" RSC
5	5	REC: CHILLER YARD	1.20			10.0	1	100	20	#12	#12	#12	3/4" RSC
7	7	CHILLER EVAPORATOR HEATERS	0.80	6.7			1*	100	20	#12	#12	#12	3/4" RSC
9	9	HEAT TRACING: CHILLED WATER PIPE	0.60		5.0		1	100	20	#12	#12	#12	3/4" RSC
11	11	CHILLER CONVENIENCE RECEPTACLE	1.20			10.0	1	100	20	#12	#12	#12	3/4" RSC
13	13	SPARE					1	100	20				
15	15	SPARE					1	100	20				
17	17	SPARE					1	100	20				
	2	SPACE & BUS ONLY					1	100					
	4	"					"	"					
	6	"					"	"					
	8	"					"	"					
	10	"					"	"					
	12	"					"	"					
	14	"					"	"					
	16	"					"	"					
	18	"					"	"					
TOTALS			5.60	11.7	15.0	20.0							

* => GFI FOR EQUIPMENT PROTECTION

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SHEET 2 OF 2
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