

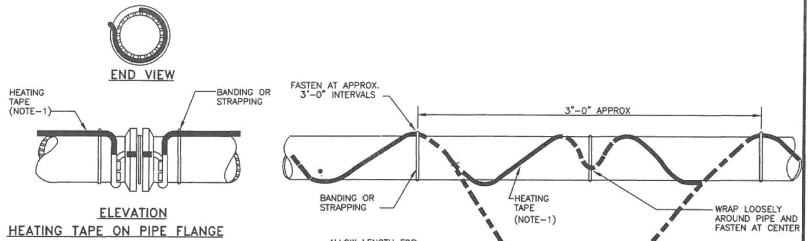
TABLE 1

PIPE SIZE	WATTS PER FT.	INSULATION PIPE SIZE
1/2"	2.7	3/4"
3/4"	3.1	1"
1"	3.5	1 1/4"
1 1/2"	4.5	2"
2"	5.2	2 1/2"
3"	7.0	3 1/2"
4"	8.4	4 1/2"
5"	10.2	6"
6"	11.3	7"
7"	13.0	8"
8"	14.5	9"
9"	15.0	10"
10"	17.5	10"
12"	20.5	12"

TABLE 2

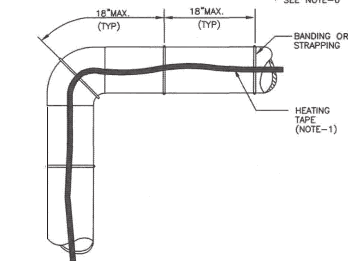
PIPE SIZE	VALVE (WATT)	CHECK VALVE (WATT)	PIPE* SUPPORT (WATT)	FLANGE (WATT)
1/2"	2.7	2.7	8.1	2.0
3/4"	3.1	3.1	8.5	2.3
1"	3.5	4.4	8.8	2.6
1 1/2"	9.0	6.8	9.0	3.4
2"	10.4	7.8	9.4	3.9
3"	21.0	10.5	10.0	5.3
4"	28.2	12.5	10.5	6.3
5"	30.6	15.3	11.0	7.8
6"	33.9	17.0	11.5	8.5
7"	39.0	19.5	12.0	9.8
8"	43.5	21.8	12.5	11.5
9"	48.0	24.0	13.0	13.0
10"	52.5	26.3	14.0	17.5
12"	69.0	31.0	15.6	20.7

\* SEE NOTE-8

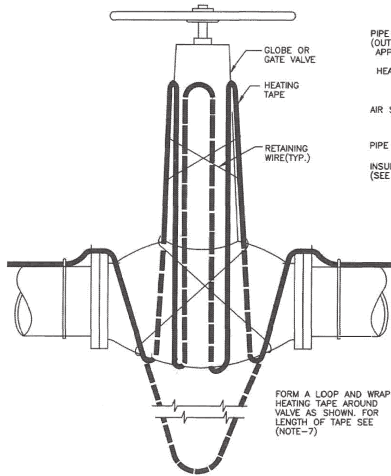


HEATING TAPE ON PIPE FLANGE

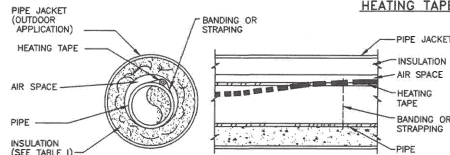
HEATING TAPE INSTALLATION ON PIPE



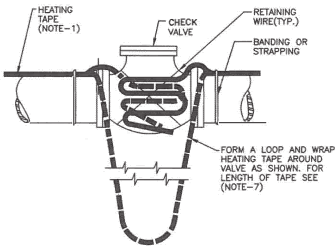
HEATING TAPE ON ELBOW



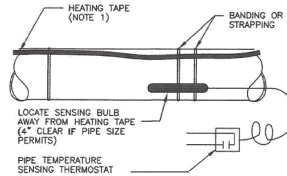
HEATING TAPE ON GATE OR GLOBE VALVE



INSULATION FOR HEATING TAPE



HEATING TAPE ON CHECK VALVE



THERMOSTAT BULB INSTALLATION

NOTES

1. PROVIDE REQUIRED WATTS PER FOOT BY A SINGLE TAPE ALONG THE SIDE OF, OR SPIRALING AROUND THE PIPE OR BY MULTIPLE TAPES PARALLELING THE PIPE.
2. DO NOT BEND TAPE TOO SHARPLY (MINIMUM BENDING RADIUS IS 6 TIMES THE TAPE DIAMETER).
3. DO NOT ALLOW TAPES TO OVERLAP OR TOUCH.
4. DO NOT PULL TAPES TIGHT. ALLOW FOR HEAT EXPANSION.
5. BANDING OR STRAPPING - MAXIMUM SPACE BETWEEN FASTENERS - 18 INCHES.
  - A. STRAPPING - 1/2"x.020 STAINLESS STEEL STRAP AND CLIPS FOR APPLICATIONS ABOVE 10 WATTS/FT.
  - B. WIRE - 18 GAUGE (.047"DIA.) DEAD SOFT ANNEALED STAINLESS STEEL WIRE. FOR APPLICATION TO AND INCLUDING 10 WATTS/FT.
  - C. GLASS TAPE - ACCEPTABLE FOR APPLICATIONS BELOW 6 WATTS/FT.
6. NOT REQUIRED IF INSULATED PIPE SUPPORTS ARE USED.
7. L = LENGTH OF HEATING TAPE REQUIRED IN FEET. (PER FOOT OF PIPE)
  - L = WATTS(PER FT. OF PIPE)REQUIRED(TABLE 1 OR 2) / HEATING TAPE OUTPUT WATTS/FT.
8. IF 2.0" THICK INSULATION IS PROVIDED, REDUCE WATTS PER FOOT BY 35%.

DESIGNED	J.F. SAKR	4-78	NUMBER	DESCRIPTION	DATE	BY	DESCRIPTION
DRAWN	D.H. KERR	4-78			08/2001	ENGA	Revised and issued by the Authority
CHECKED	D. LEWIS	1-79					
APPROVED	J. HANSEN	1-79					

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
 DEPARTMENT OF TRANSIT SYSTEM DEVELOPMENT  
 OFFICE OF ENGINEERING AND ARCHITECTURE

SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DIRECTOR \_\_\_\_\_ May 3, 2001 DATE

MECHANICAL STANDARD DRAWING  
 TYPICAL INSTALLATIONS OF  
 HEATING TAPE FOR PIPING

SCALE NONE DRAWING NO. ST-M-141

# WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

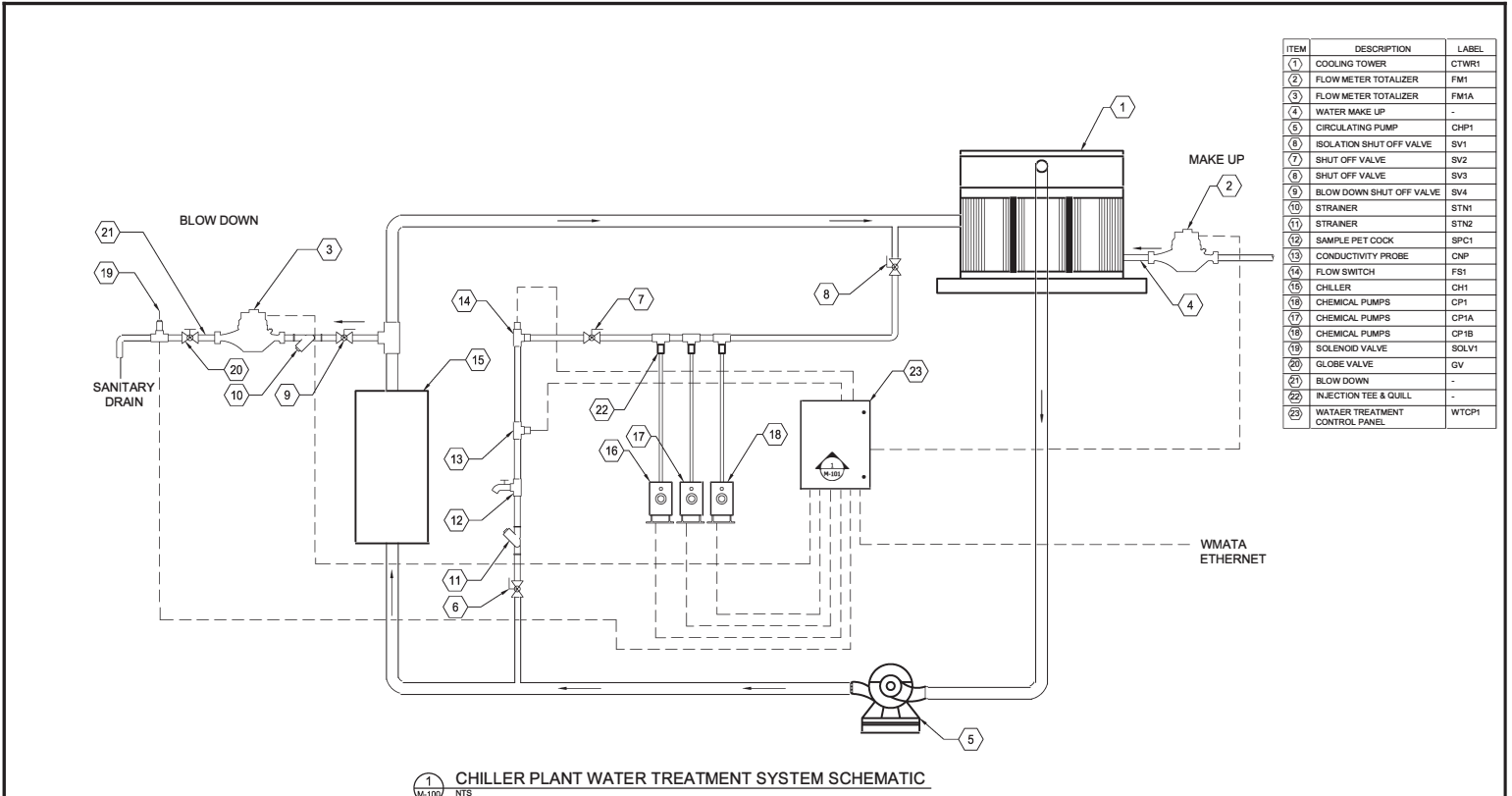


## WMATA CHILLER PLANT

### CHILLER PLANT CONTROL PANEL STANDARD DESIGN

10-01-2015

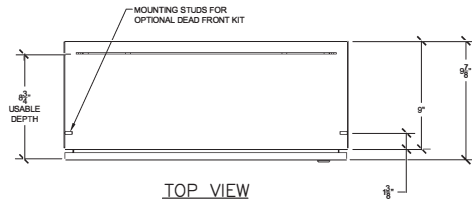
WMATA  
CENI/POWER



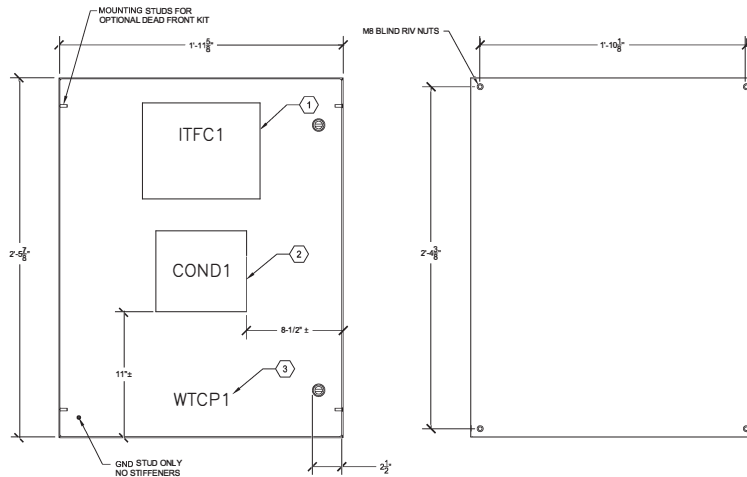
ITEM	DESCRIPTION	LABEL
①	COOLING TOWER	CTWR1
②	FLOW METER TOTALIZER	FM1A
③	WATER MAKE UP	-
④	CIRCULATING PUMP	CHP1
⑤	ISOLATION SHUT OFF VALVE	SV1
⑥	SHUT OFF VALVE	SV2
⑦	SHUT OFF VALVE	SV3
⑧	BLOW DOWN SHUT OFF VALVE	SV4
⑨	STRAINER	STN1
⑩	STRAINER	STN2
⑪	SAMPLE PET COCK	SPC1
⑫	CONDUCTIVITY PROBE	CNP
⑬	FLOW SWITCH	FS1
⑭	CHILLER	CH1
⑮	CHEMICAL PUMPS	CP1
⑯	CHEMICAL PUMPS	CP1A
⑰	CHEMICAL PUMPS	CP1B
⑱	SOLENOID VALVE	SOLV1
⑲	GLOBE VALVE	GV
⑳	BLOW DOWN	-
㉑	INJECTION TEE & QUILL	-
㉒	WATER TREATMENT CONTROL PANEL	WTCP1

1 CHILLER PLANT WATER TREATMENT SYSTEM SCHEMATIC  
M-100 NTS

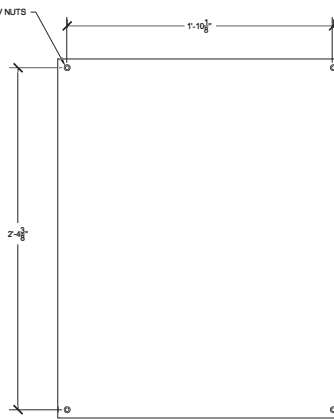
CONTRACT NO.									
DESIGNED	YLL 08/12	NUMBER	DESCRIPTION	DATE	BY	REVISIONS	DESCRIPTION	WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY DEPARTMENT OF TRANSIT INFRASTRUCTURE & ENGINEERING SERVICES CHIEF ENGINEER INFRASTRUCTURE SERVICES	MECHANICAL DESIGN DRAWING SECTIONS AND DETAILS TO WATER TREATMENT SYSTEM SCHEMATIC
DRAWN	YLL 08/12							SUBMITTED _____ DATE _____ APPROVED _____ CHEF ENGINEER	SCALE AS NOTED DRAWING NO. _____ SHEET NO. ST-M-100
CHECKED	PP 08/12								
APPROVED	PP 08/12								



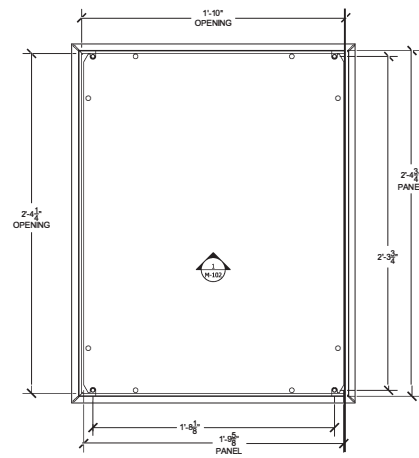
TOP VIEW



FRONT VIEW



REAR VIEW



OPEN VIEW

KEY NOTES

- TOUCH PANEL (LABEL: ITFC1), C-MORE MODEL NUMBER EA7-TBC WITH 15 PIN VGA CONNECTOR MALE, OR EQUIVALENT.
- CONDUCTIVITY CONTROLLER (LABEL: COND1), MANUFACTURER: HACH MODEL NUMBER SC200 WITH ONE (1) NETWORK MODULE, TWO (2) SENSOR MODULES, AND TWO (2) ELECTRODELESS CONDUCTIVITY SENSOR (HACH MODEL #3725E21) OR EQUIVALENT.
- EXTERNAL CABINET LABELING TO BE SCREWED AND GLUED IN PLACE ON WHITE BACKGROUND WITH BLACK ENGRAVED LETTERING. ALL EQUIPMENT AND INTERNAL COMPONENTS SHALL BE IDENTIFIED USING MACHINE PRINTED LABEL ON BACK PLATE, VISIBLE WITH COMPONENT IN PLACE, LETTER TO BE MINIMUM X" TALL.

1 WATER TREATMENT CONTROL PANEL (WTCP1)  
3" = 1'-0"

CONTRACT NO.

DESIGNED	YLL	08/12	REFERENCE DRAWINGS		REVISIONS		
			NUMBER	DESCRIPTION	DATE	BY	DESCRIPTION
DRAWN	YLL	08/12					
CHECKED	PP	08/12					
APPROVED	PP	08/12					

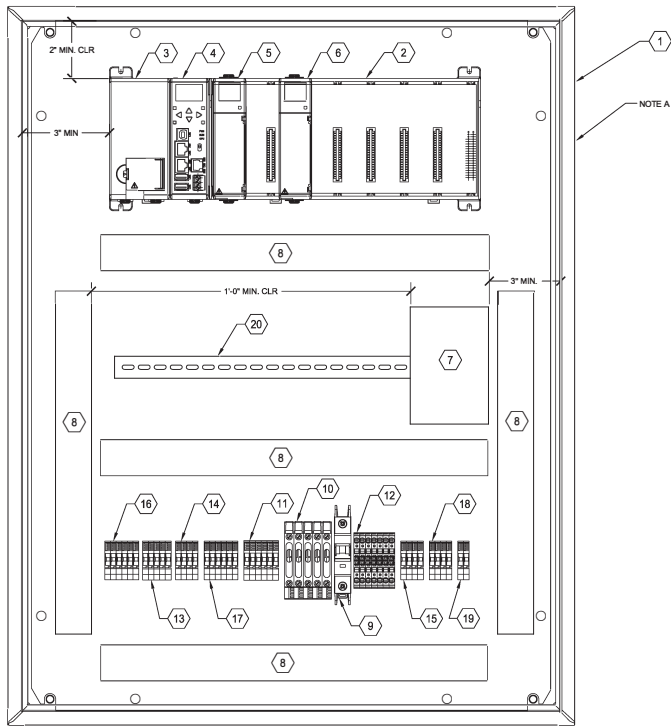
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
DEPARTMENT OF TRANSIT INFRASTRUCTURE & ENGINEERING SERVICES  
CHIEF ENGINEER INFRASTRUCTURE SERVICES

MECHANICAL DESIGN DRAWING

SECTIONS AND DETAILS TO  
WATER TREATMENT SYSTEM CONTROL PANEL

SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ CHIEF ENGINEER \_\_\_\_\_ DATE \_\_\_\_\_

SCALE AS NOTED DRAWING NO. SHEET NO. ST-M-101



CABINET EQUIPMENT		
ITEM	EQUIP. LABEL	DESCRIPTION
1	WTCP1	NEMA 4X ENCLOSURE
2	BASE	8-SLOT I/O BASE
3	CP5	POWER SUPPLY 24-48VDC FOR PLC CONTROLLER
4	CPU	266 MHZ CPU PROCESSOR FOR CONTROLLER
5	1SCIP	16PT IN/PUT SINK/SOURCE FOR CONTROLLER
6	SCOP	8CH RELAY OUTPUT ISOLATED FOR CONTROLLER
7	PS	POWER SUPPLY 19-24-100P
8	-	WRING DUCT W/ COVER
9	CB	CIRCUIT BREAKER
10	FTB	FUSE TERMINAL BLOCK W/ LED
11	TB5	TERMINAL BLOCKS, GRAY
12	TB6	TERMINAL BLOCKS, BLUE
13	TB2	TERMINAL BLOCKS, BLACK
14	TB3	TERMINAL BLOCKS, GREEN
15	TB7	TERMINAL BLOCKS, ORANGE
16	TB1	TERMINAL BLOCKS, RED
17	TB4	TERMINAL BLOCKS, WHITE
18	TB8	TERMINAL BLOCKS, YELLOW
19	TB9	TERMINAL BLOCKS, GREEN
20	-	SLOTTED STEEL DIN RAIL

GENERAL NOTES:

- A. WIRINGS NOT SHOWN FOR CLARITY. SEE CONTROL WIRING SCHEMATICS.
- B. ALL WIRES TO BE IDENTIFIED WITH HEAT SHRINK MACHINE LABELED SLEEVES.
- C. CONTROL PANEL WIRE TO BE STRANDED WIRES, EITHER MIN(W/MACHINE TOOL WIRE) OR THHN (THERMOPLASTIC HIGH HEAT-RESISTANT NYLON-COATED).
- D. ALL ANALOG WIRE SHALL BE SHIELDED TWISTED PAIR WITH SINGLE POINT GROUND.
- E. BACK PANEL TO BE GROUNDED TO ENCLOSURE.
- F. ALL CONNECTIONS TO THE PANEL BOARD WILL BE WITH FASTENERS AND THREADED HOLES, PANEL BOARD HOLES TO BE THREADED.
- G. TERMINAL BLOCKS TO BE MOUNTED ON DIN RAILS. THESE DIN RAILS WILL BE MOUNTED TO THE PANEL WITH BRACKET SUPPORTS, ANGLED BRACKET SUPPORTS WILL BE USED FOR TERMINAL BLOCKS REQUIRING FIELD WIRING. 10% SPARE TERMINAL BLOCKS TO BE INSTALLED.
- H. TERMINAL STRIP TO HAVE GROUNDING LUG TO BACK PANEL.
- I. ALL DIMENSIONS SHOWN ARE APPROXIMATE, DIMENSIONS CAN VARY BASED ON ACTUAL LOCATION OF EQUIPMENT.

1 CONTROL PANEL OPENING VIEW  
14-102 6" x 11"

CONTRACT NO.

DESIGNED	YLL	08/12	REFERENCE DRAWINGS		REVISIONS		
			NUMBER	DESCRIPTION	DATE	BY	DESCRIPTION
DRAWN	YLL	08/12					
CHECKED	PP	08/12					
APPROVED	PP	08/12					

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
DEPARTMENT OF TRANSIT INFRASTRUCTURE & ENGINEERING SERVICES  
CHIEF ENGINEER INFRASTRUCTURE SERVICES

SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
CHIEF ENGINEER

MECHANICAL DESIGN DRAWING

SECTIONS AND DETAILS TO  
WATER TREATMENT SYSTEM CONTROL PANEL

SCALE AS NOTED DRAWING NO. \_\_\_\_\_ SHEET NO. ST-M-102