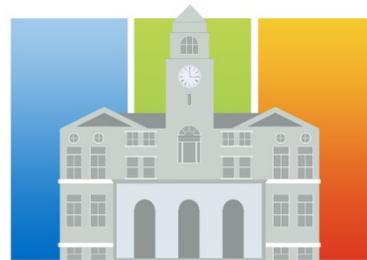

District Heat Montpelier Customer Training



DISTRICT HEAT MONTPELIER
AN ENERGY INDEPENDENT DOWNTOWN

Welcome & Overview of Training

- Introductions
- District Heat Montpelier Overview
- In-Building Components
- On-Going Maintenance and Best Practices
- Optimizing Performance
- Troubleshooting
- Charges, Billing, and Reporting
- Questions?



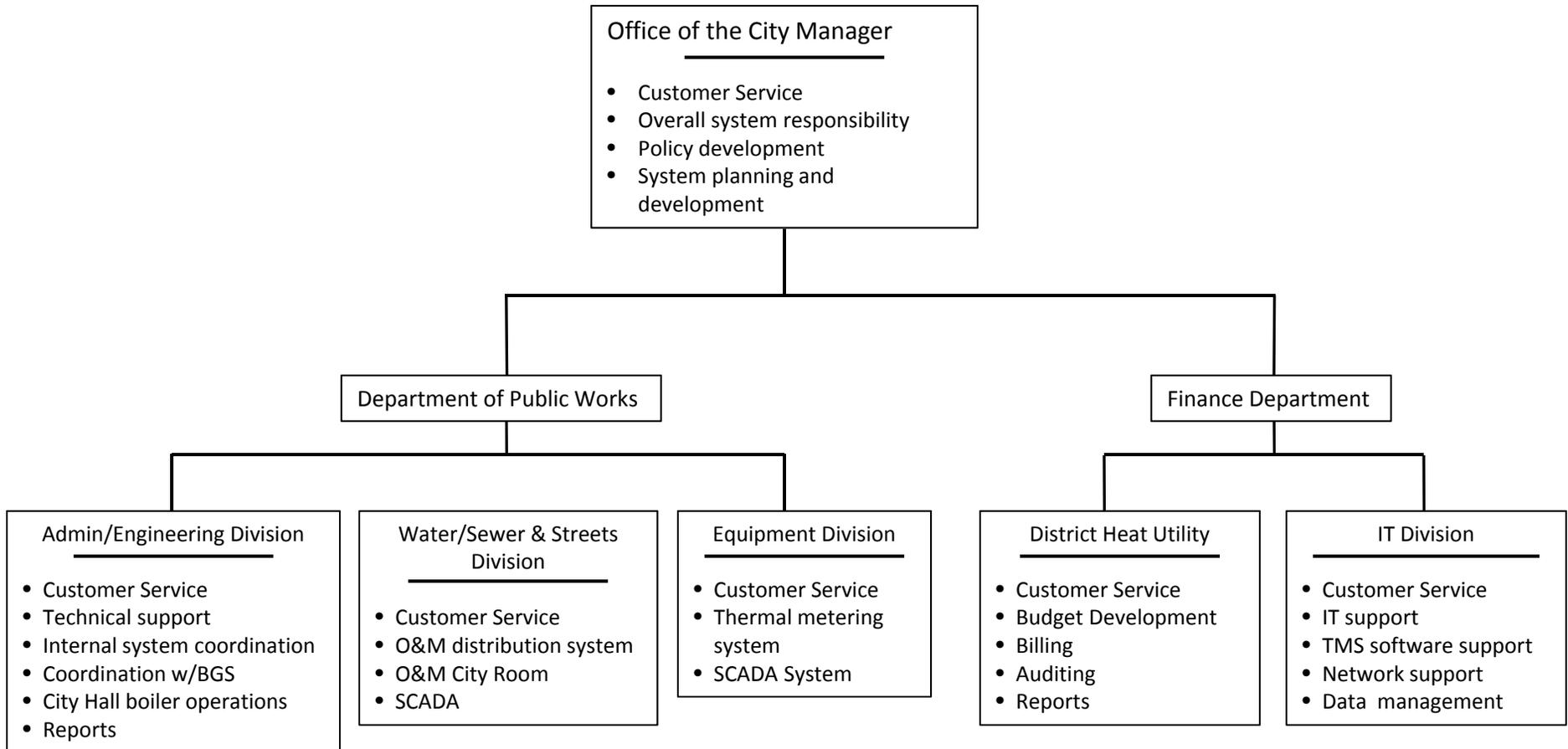
District Heat Montpelier Overview

Organizational Structure

District Heat Montpelier is the municipal utility that purchases energy produced by the State of Vermont's heat plant and distributes it to customers in the City of Montpelier

- Agreements in place between City and State governing procurement and operations.
- Enterprise fund within the City of Montpelier.

Organizational Structure



Vision

Better Environment, Stronger Community

- Efficient energy use
- Fuel flexibility
 - Incorporate local, sustainable resources
 - Allow for quicker response to future market changes and new technologies
- Stable energy rates
- Improved economic competitiveness
- Limit building owner liability – Remove individual oil tanks and boilers from the floodplain
- Effectively managed heat utility

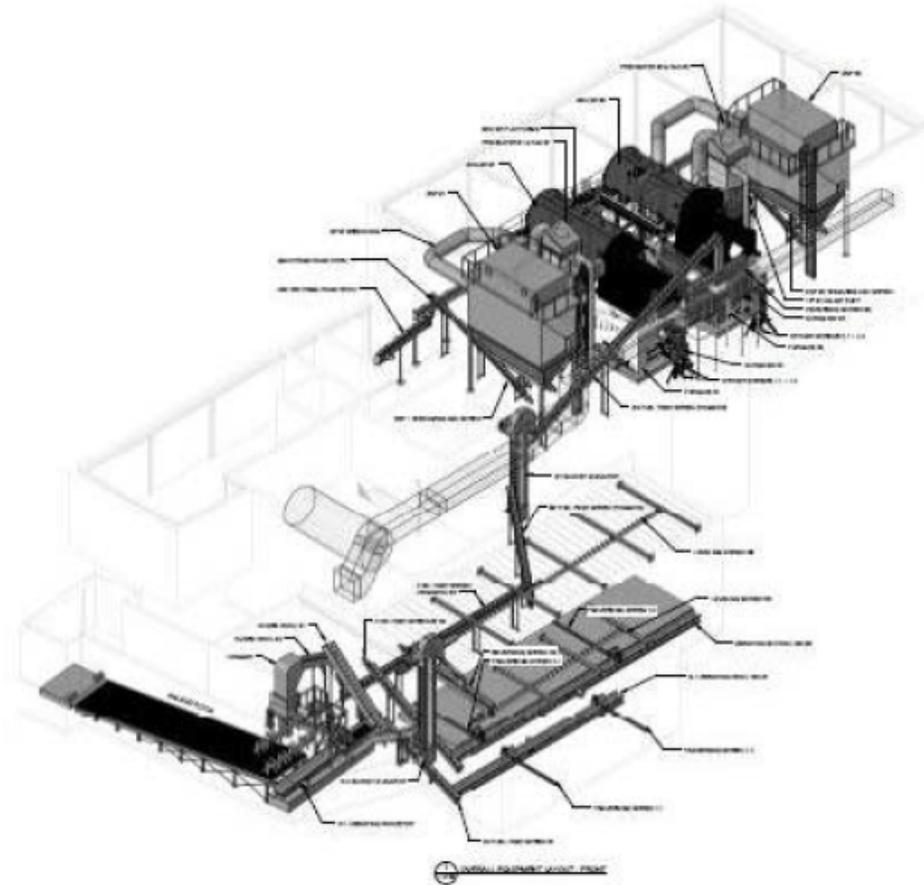


State's Heat Plant



State's Heat Plant

Central Heat Plant – Boiler Train



State's Heat Plant

Inside the Central Heat Plant



State's Heat Plant: City Room



Customers

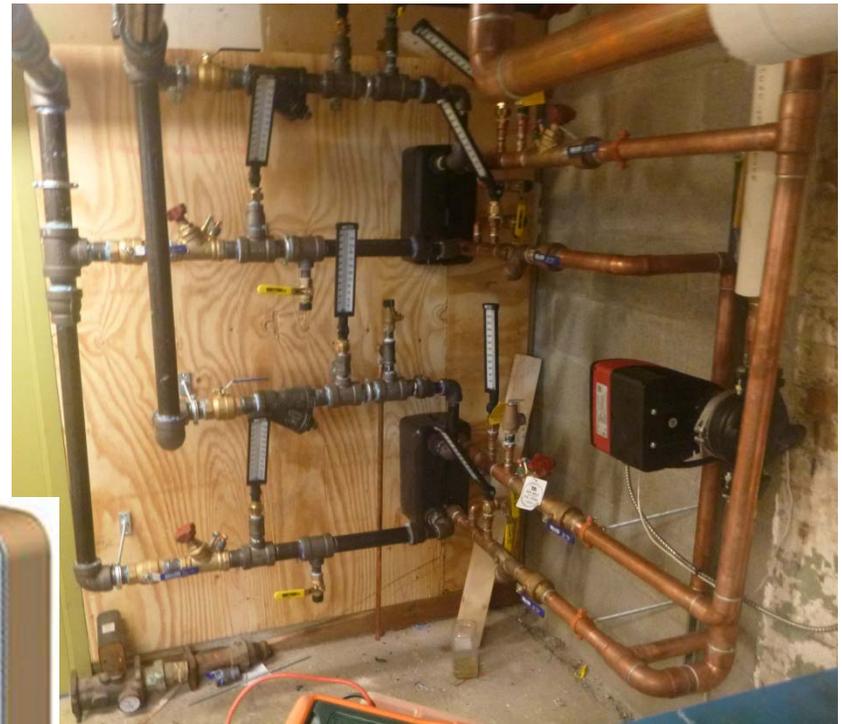
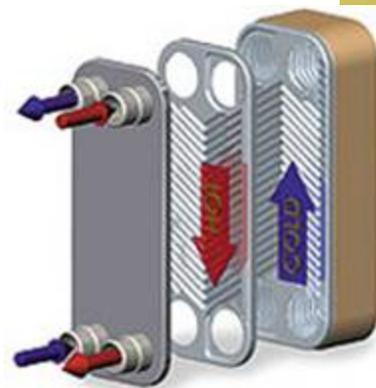
Building	Customer	Building
1	1	Beard Building
2	2	Bethany Church, UCC
3	3	Christ Episcopal Church
4	4	City Center
5	5	City Hall
6		Fire Station
7	6	Everett - Capitol Grounds
8		Everett - Julio's
9		Everett - Insurance Company
10	7	FairPoint Communications
11	8	GSA
12	9	Kellogg-Hubbard Library
13	10	NECI/N&M Real Estate
14	11	Police Station
15	12	River Street Associates
16		River Street Associates
17	13	Union Elementary School
18	14	Washington County - Courthouse
19		Washington County - Sheriff's Office
20	15	Vermont Mutual



In-Building Components

Mechanical Components

- Heat exchangers (brazen plate)
- Pumps/VFDs
- Valves (globe or ball type)
- Meters
- Strainers
- Vents & drains
- Building controls



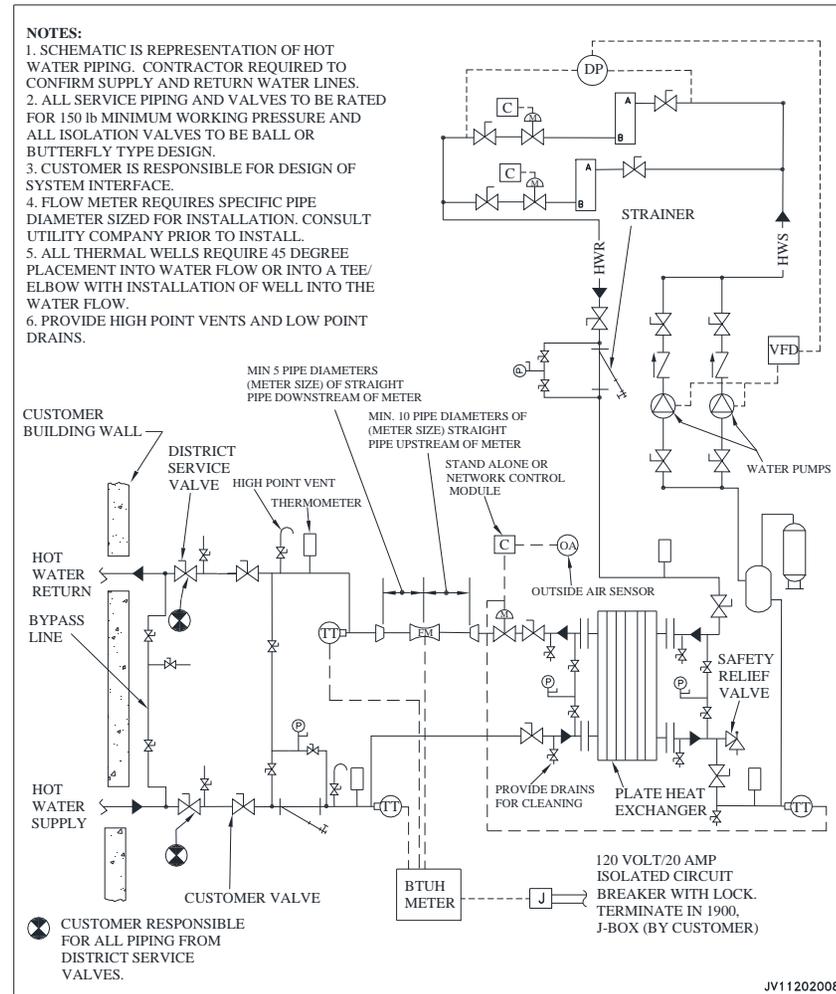
Mechanical Components



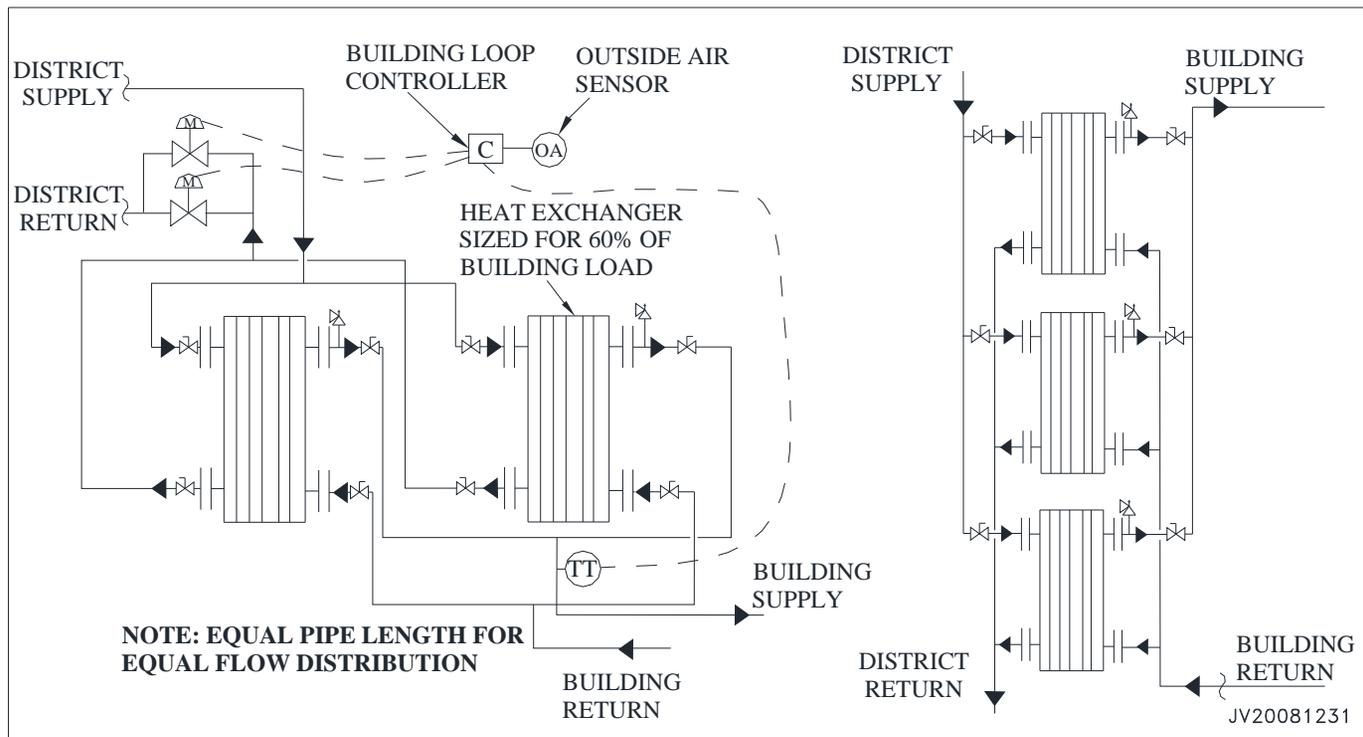
System Overview

Hydronic Interface

- 220°F supply hot water
- 170°F return water
- 100 psig
- 15 psid allowance
- 50°F delta T on heating
- 8" diameter pre-insulated hot water pipe.

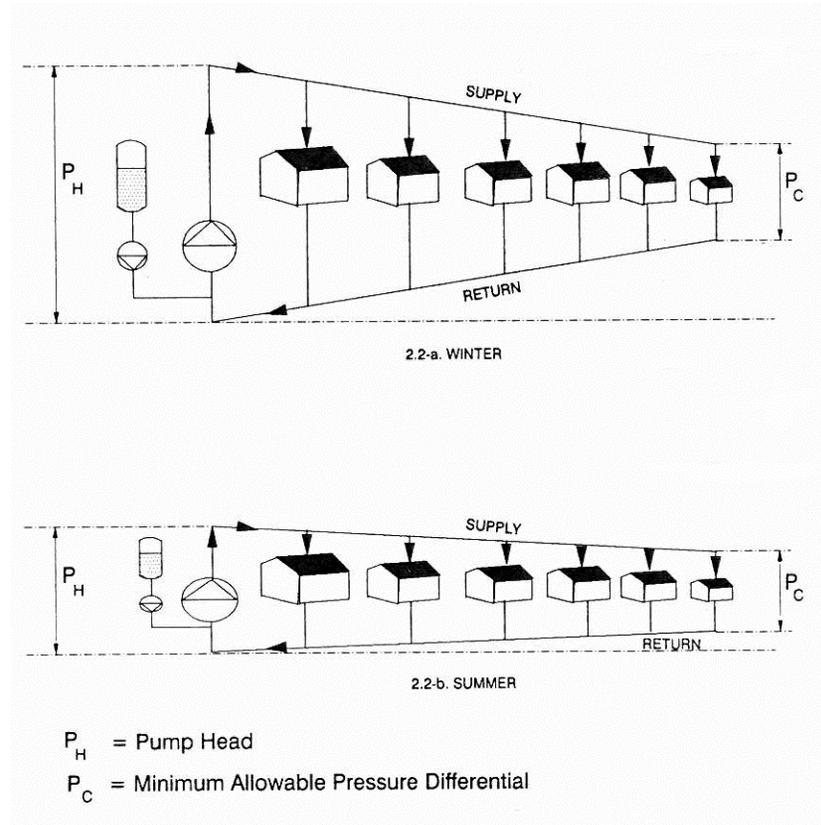


Principal Connection Methods for Uniform Flow



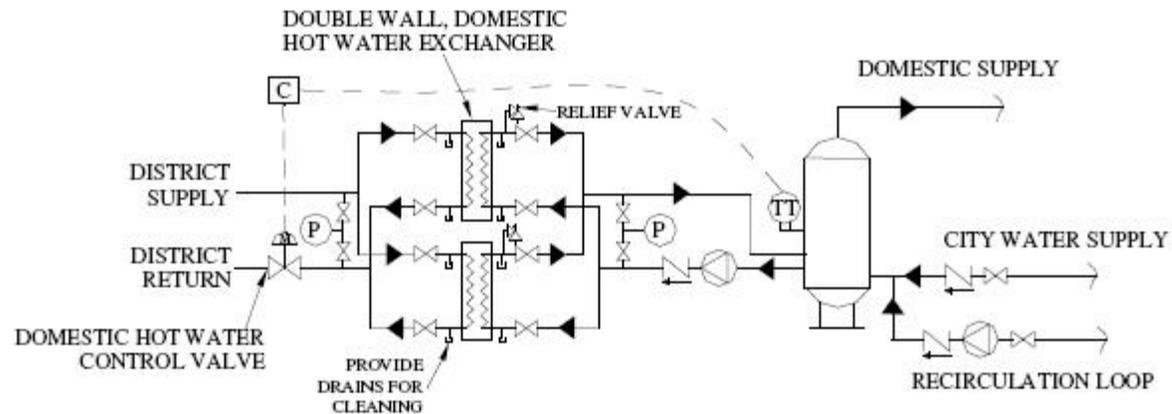
Distribution System Pressure Differentials

The district heating system pressure varies depending on the location of the customer's building. The contractor has taken that information into account when selecting the control equipment.



Domestic Hot Water Interface

- 130 °F Domestic hot water set point
- Globe or Ball type control valve
 - 110 psi valve close off
 - 30:1 turn down ratio
- Double Wall Brazed or Shell-in-Tube HX design acceptable.



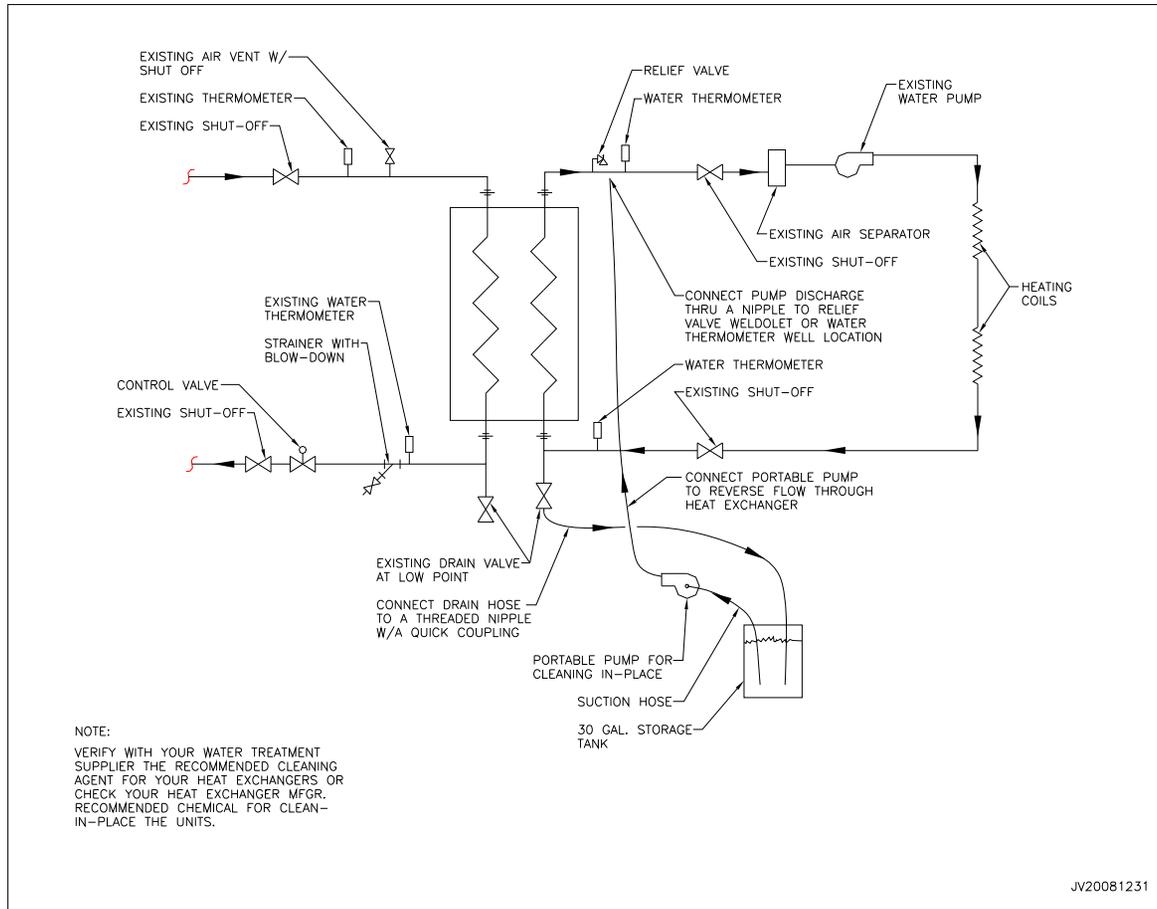
*Ongoing Maintenance &
Best Practices*

Preventative Maintenance Program

- Ensure that all mechanical equipment is operating efficiently and using energy wisely
- Fall - prepare for winter
- Spring - prepare for summer



Heat Exchanger Cleaning Procedure



Plugged Strainers



Controls



Control Valve Failure



Water Safety

District Heat water is normally above the atmospheric boiling point, so you should exercise caution when opening a drain or blowdown because a water vapor is formed.



Water Treatment – In-Building Loop

Good water

- Easily pumped
- Efficient
- Environmentally friendly
- Closed loops take little make up water

Bad water

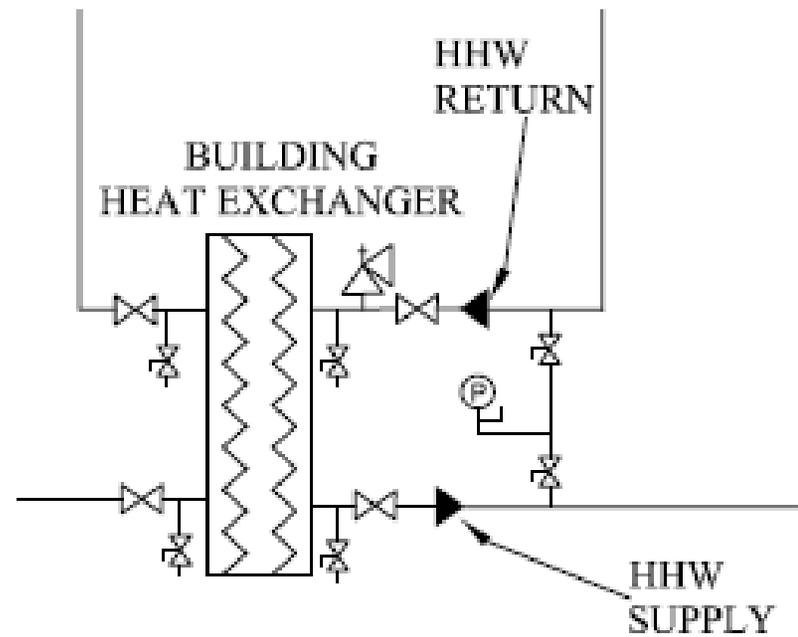
- Corrosion
- Scale
- Fouling



Scale Reduces Heat Transfer Efficiency

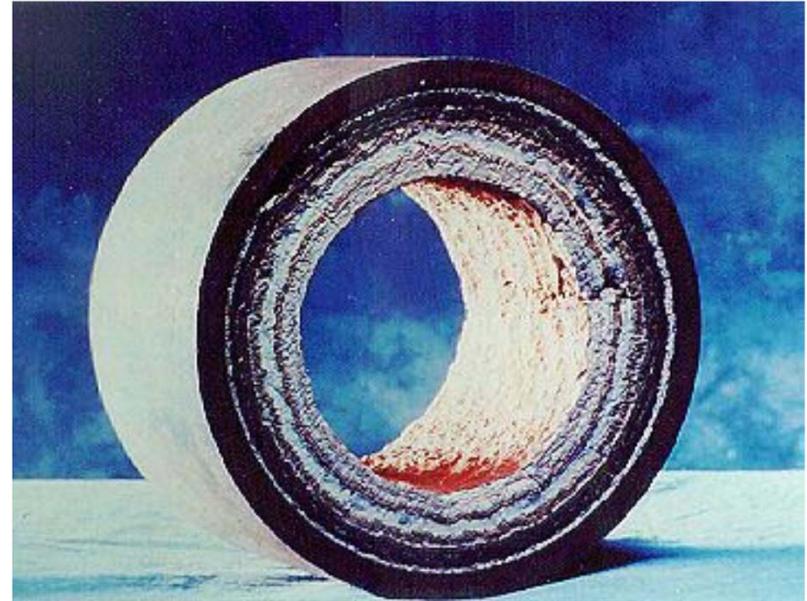


Hx Fouling

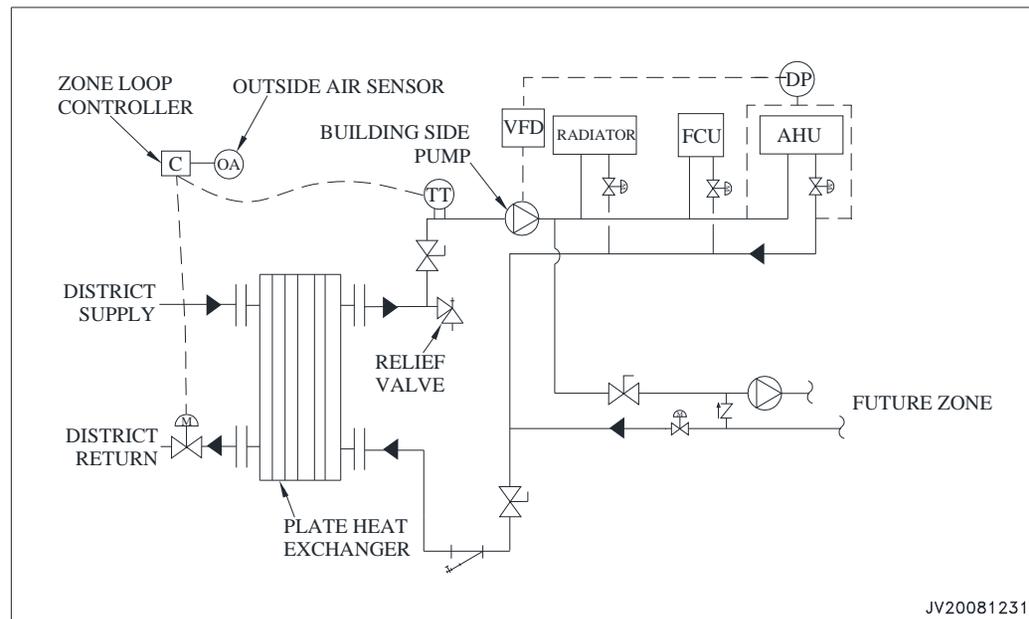


Water Treatment Summary

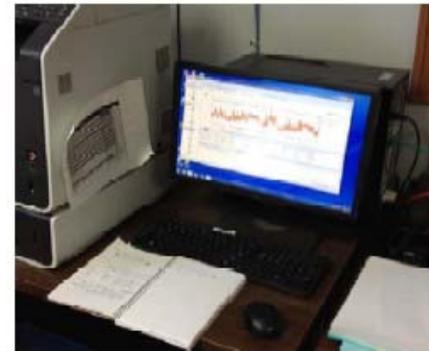
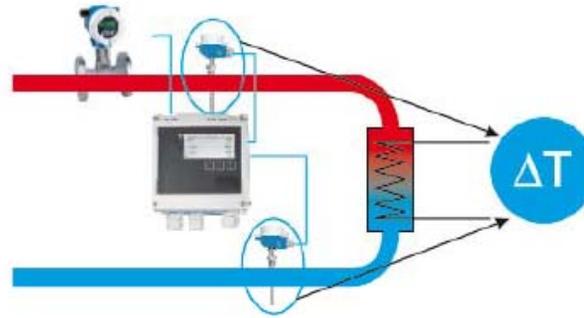
- Water is required for corrosion.
- Flow is required for corrosion inhibition.
- Areas under deposits are not controlled and localized corrosion can happen.
- Summer maintenance
- Third party water test



Distribution Pumps

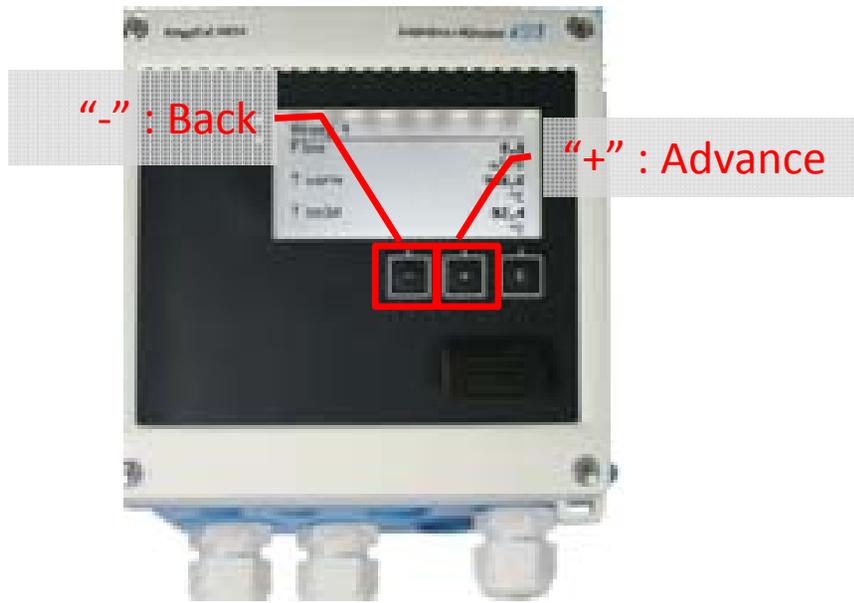


Thermal Metering System

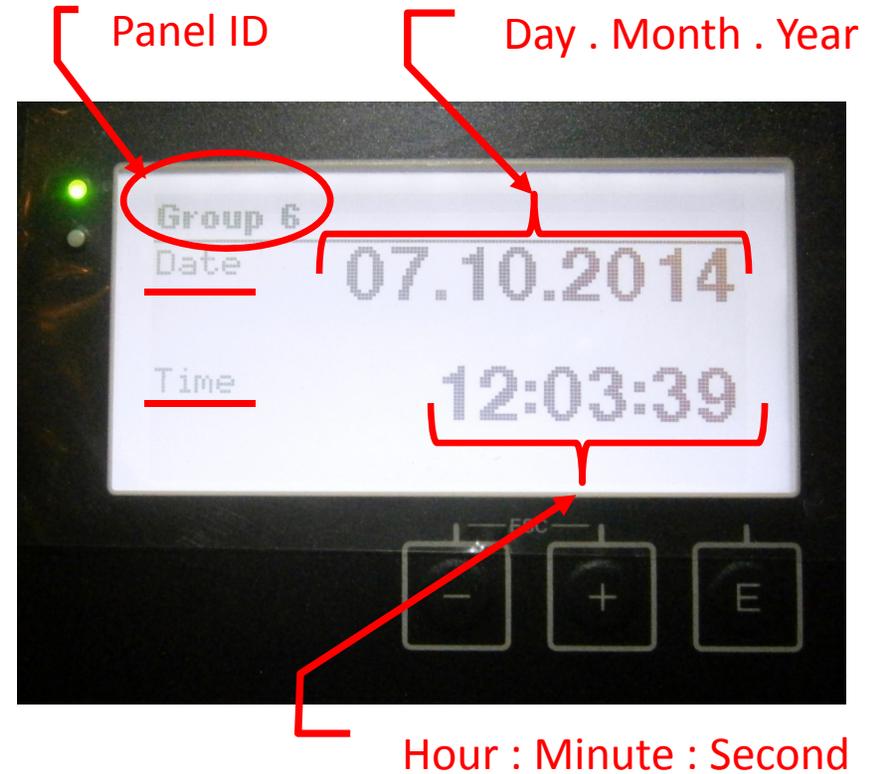


- Meters measure temperature and flow
- Basis of billing

Information Directly Available to Customer From TMS



BTU or Energy Meter

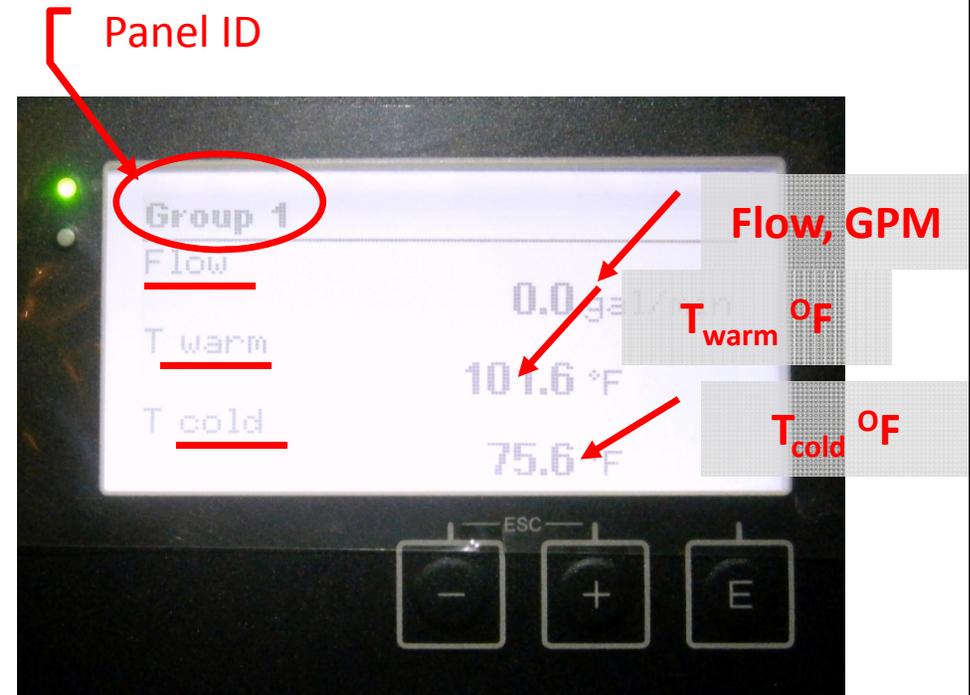


Hour : Minute : Second

Information Directly Available to Customer From TMS



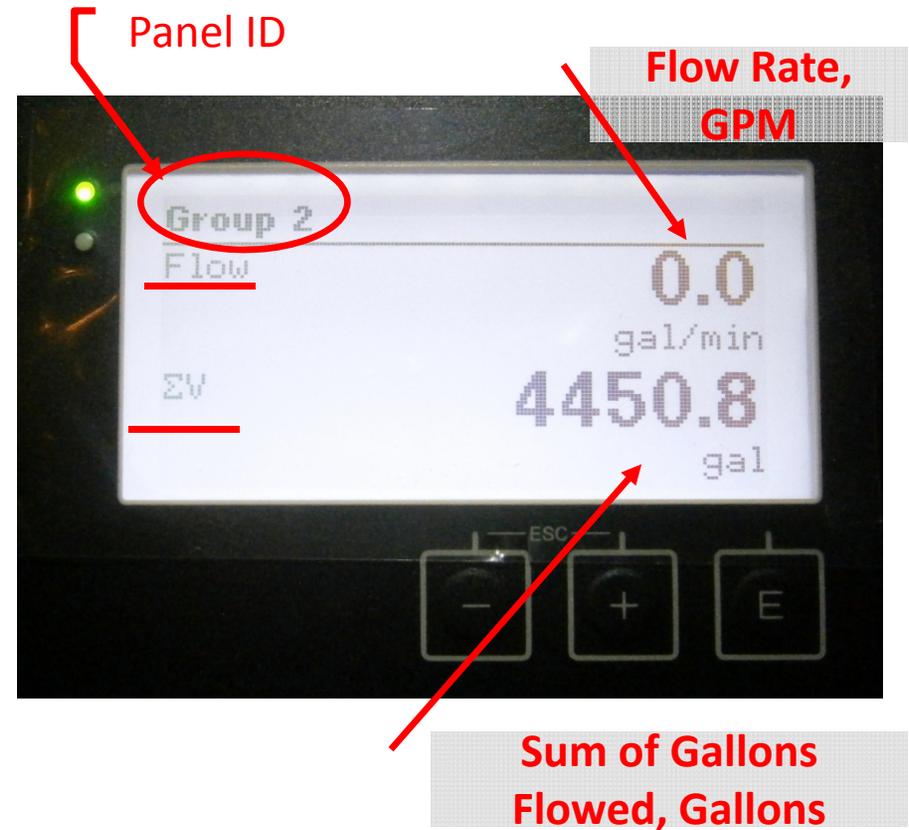
BTU or Energy Meter



Information Directly Available to Customer From TMS



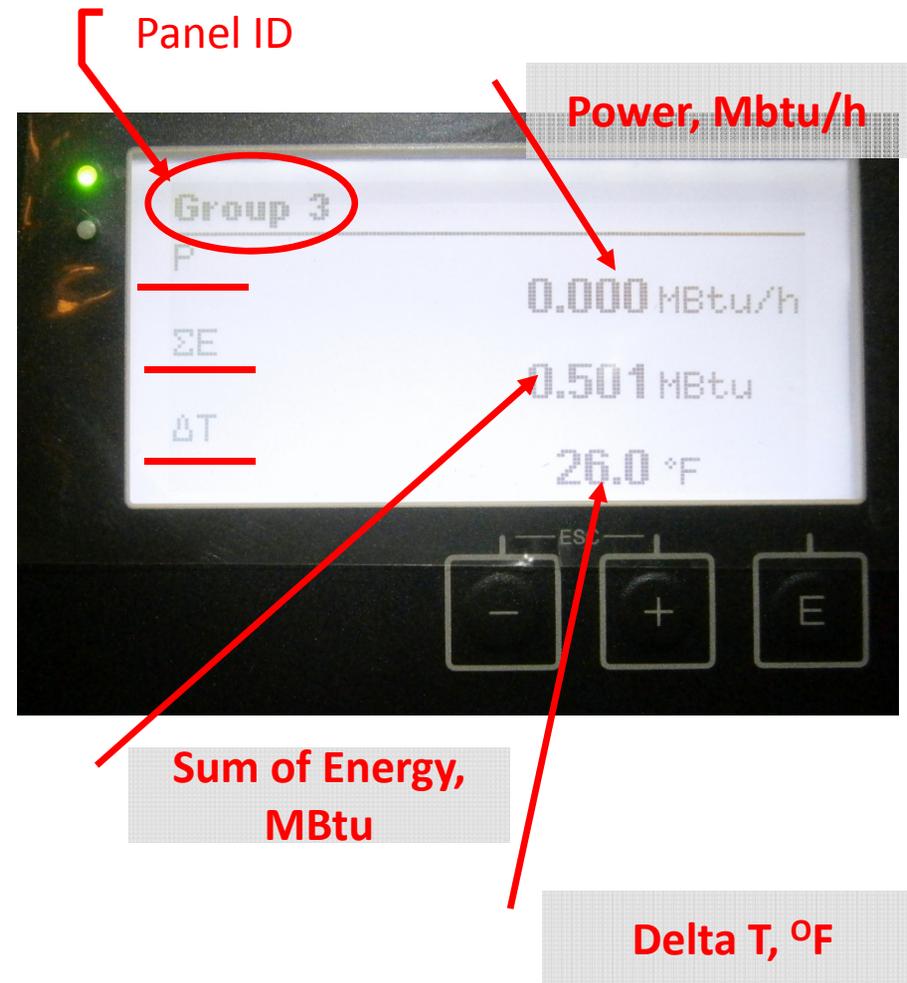
BTU or Energy Meter



Information Directly Available to Customer From TMS



BTU or Energy Meter



Instrument Air System

- Check the storage tank for rust spots.
- Drain the tank and check the auto drain.
- Check the air filter intake. Replace if necessary.
- Change the crankcase oil and check the pressure.
- Check the operation of the unloader.
- Check the high pressure safety valve. Replace if necessary.

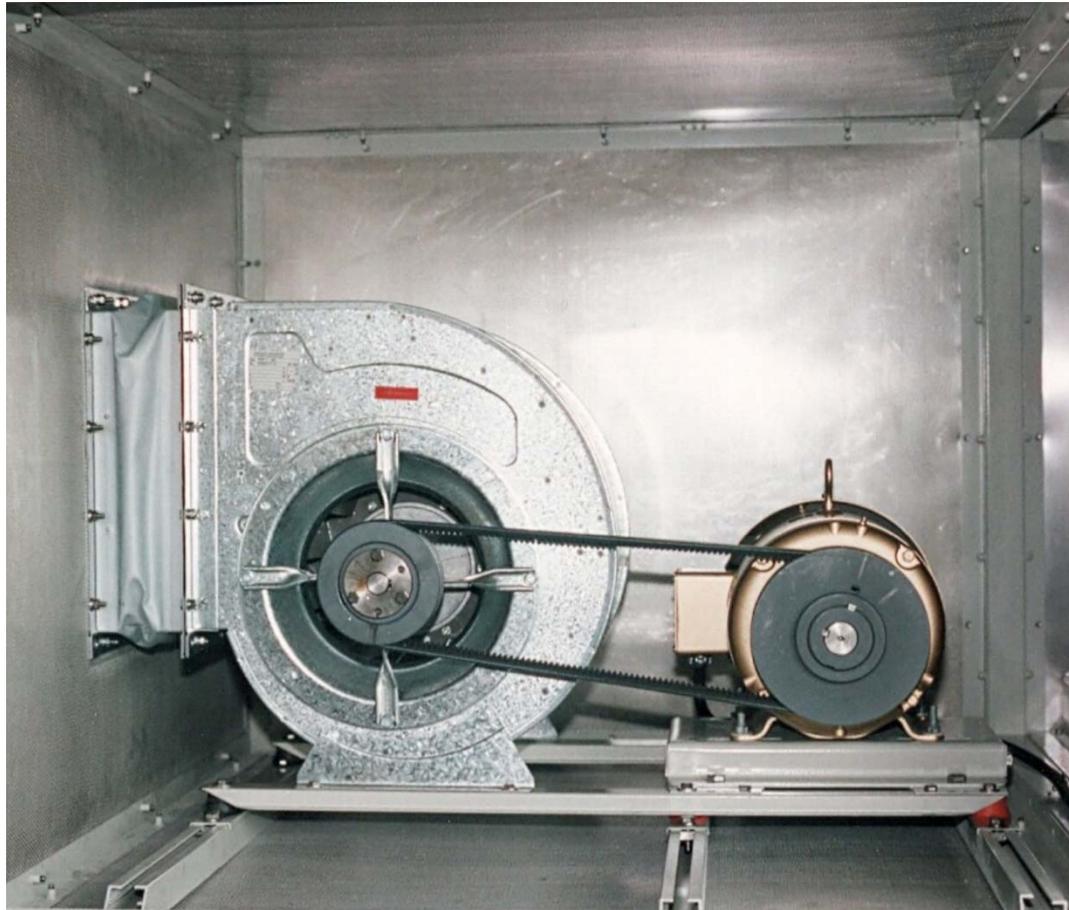


Air Dryer

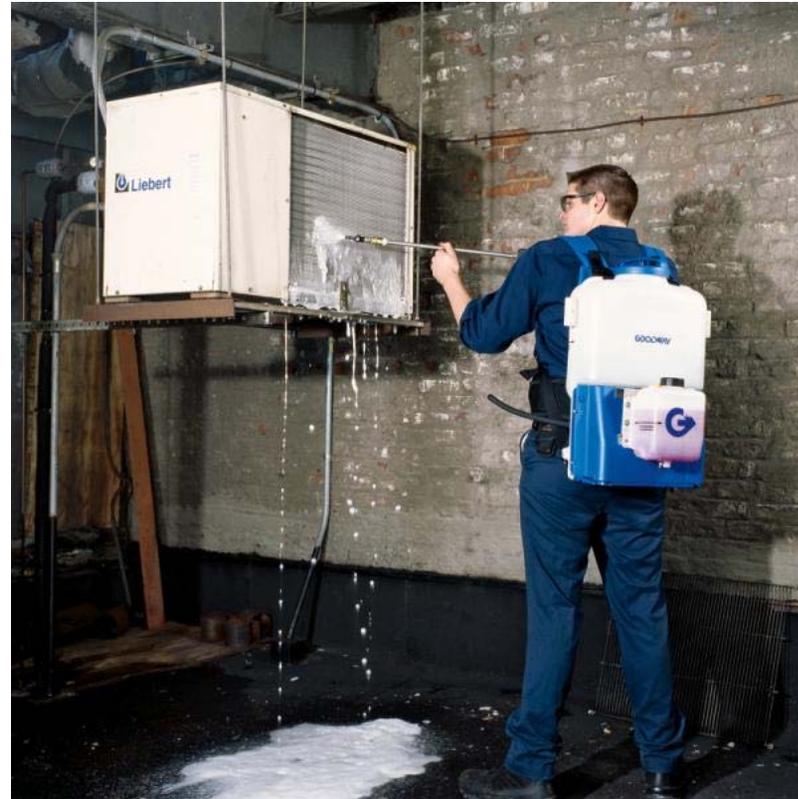
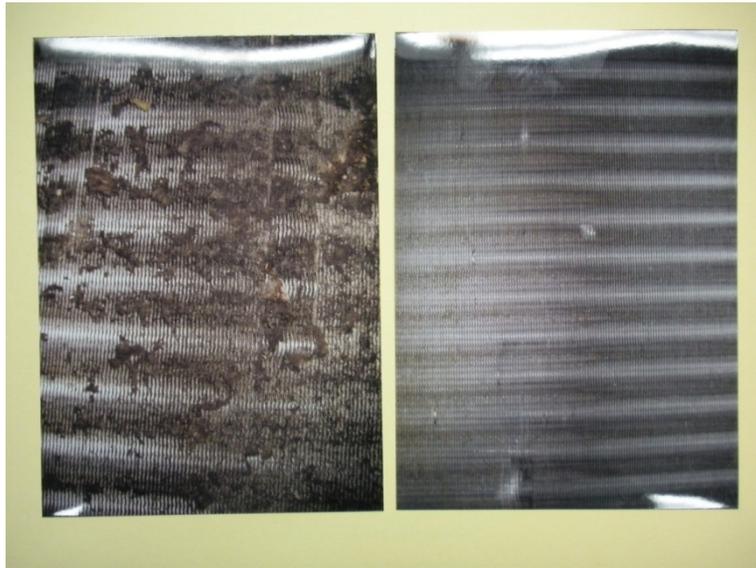
- Clean the air dryer condenser fins and cover grille. Replace the filter.
- Check the air dryer drain and trap.
- Check the air dryer refrigerant pressure and temperature. Refill if necessary
- Check the air dryer pressure reducing valves. Replace if necessary.



Air Handling Units



Fan Coil Maintenance



Radiators & Reheat Coils

- Visually inspect the fins on the radiation element and coils. Very gently brush clean if necessary, taking care not to bend the fins.
- Inspect base board radiators and brush clean from dust.
- Check air vents to make sure they are in operating condition.
- After summer shut down, remove air from the heating loop.
- For proper air circulation, make sure that equipment is not used as shelving or storage.



Optimizing Performance

Optimizing Performance

- Controls
- Building setbacks and minimizing peaks
- Outdoor air reset schedule
- Management of building peaks & system peaks.
 - During early operations, DHM will work with customers to stagger morning ramp-ups to keep system peak down.
 - Customers should develop a ramp-up plan that is methodical so that valves aren't opening up wide-open to keep individual building peaks down.

Daily Start Up

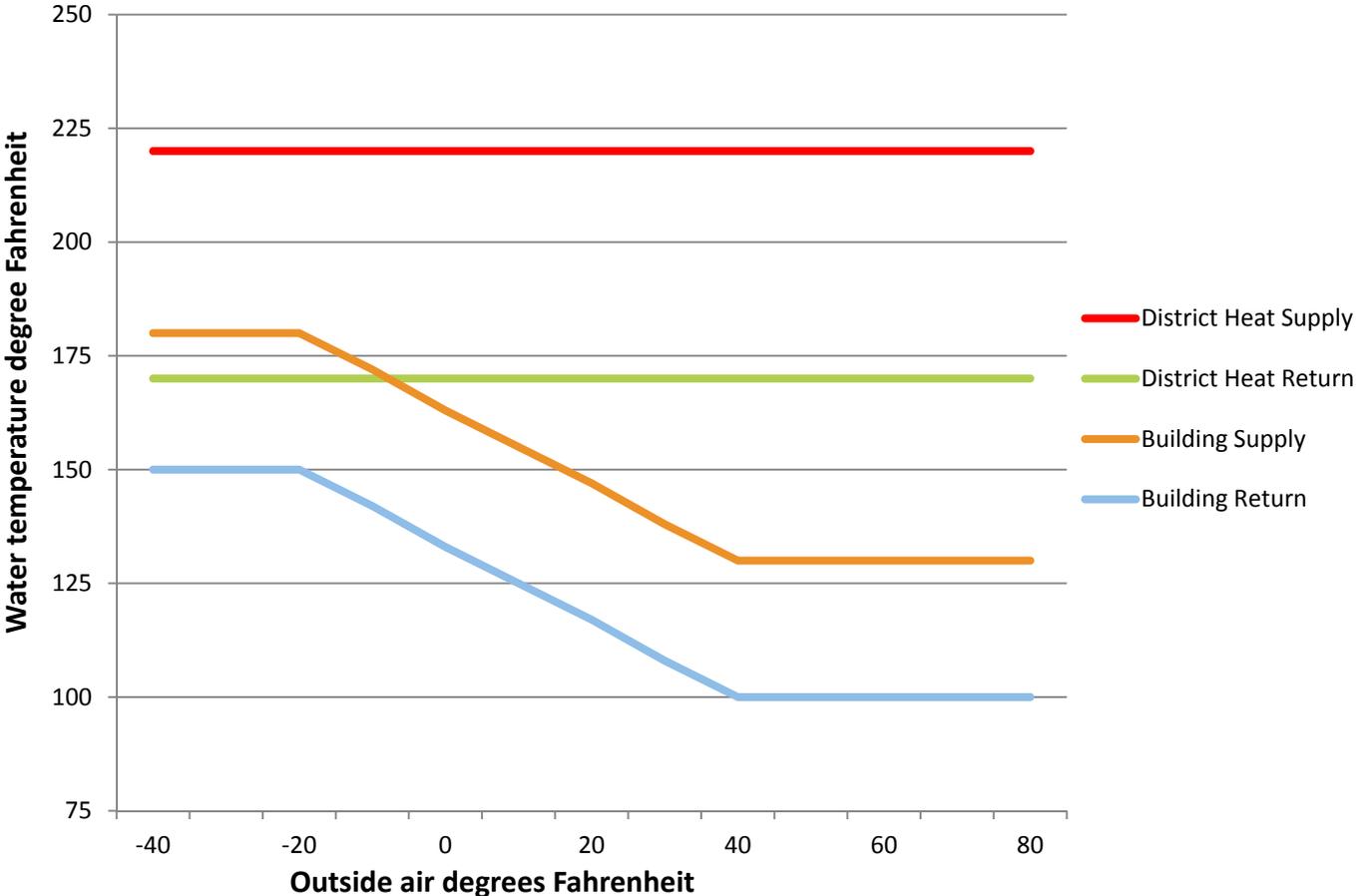
- Without staging



- With staging



Building Loop Temperature Reset Schedule



Troubleshooting

Troubleshooting

If you experience a heating problem, check the following:

- Control valve is open
- Isolation valves are open
- District Heat supply water temperature is 210-220 deg F
- Supply and return pressures is at least 10-20 psid

And feel free to call us!

During working hours, Monday- Friday 7 am – 3:30 pm call DPW garage at (802)223-9510. Or DPW office, M-F 8 am -4:30 pm at (802)223-9508
After working hours, weekends and holidays call Montpelier PD at (802)223-3445.

Identifying Building Issues

- Delta T problems
- Unjustified change in energy consumption.
- Building automation system operating mysteriously.
- Hot and cold spots – balancing issues
- Pump speed out of control
- Use temperature set up and set back
- Reduce air leakage in ductwork
- Follow an established maintenance program
- Control valves should be positively shut off when no heat is required.



Delta T's and Troubleshooting

- Primary Loop Concerns
 - Heat Exchanger cleaning
 - Primary Control Valve settings
- Secondary Loop Issues
 - Filters, Clean AHU, Fan Coils
 - Air in system, loop chemicals
 - Control logic, enabled, disabled, canceling out
 - Control valves P-I-D
 - Trend data points

Charges, Billing, and Reporting

DHM Charges

- Capacity Charge
 - 2014-2015 rate: \$4.84 per MBTUH
 - Contracted capacity in your Customer Agreement
 - Billed from October through April
 - Covers: City operating, maintenance, and repair costs related to District Heat Montpelier including the City's debt service attributable to the distribution system.
- Energy Charge
 - 2014-2015 rate: \$8.82 per MMBTU
 - Direct pass through from the State of Vermont
 - Based on metered usage
 - Covers: costs related to the State of Vermont's consumption of fuels, electricity, and other products required to produce the energy distributed through the system and the costs associated with running the State's Heat Plant State

DHM Bill

- Mailed out on the 10th of the month
- Usage specified
- Due by the end of the month



District Heat Montpelier
City Hall
39 Main Street
Montpelier, VT 05602

Service Location	Account #	Date of Bill	
39 Main Street - City Hall	DH001	06/10/2014	
Invoice #	Date Due	Amount Due	Amount Paid
2014020	06/30/2014	\$ 1,506.49	\$

Bill To	Mail Payment To
City of Montpelier 39 Main St. – City Hall Montpelier, VT 05602	District Heat Montpelier City Hall 39 Main Street Montpelier, VT 05602

Bill To	Account Number	Service		Date of Bill	Date Of Next Reading
		From	To		
City of Montpelier	DH001	05/01/2014	05/16/2014	06/10/2014	06/30/2014
Account Activity					
Previous Balance					\$ 5,620.31
Payments -- Thank You					\$ 5,620.31
PAST DUE AMOUNT					\$ 0.00

Subtotal \$ 0.00

May 1 – May 16, 2014
Energy Usage/Charge (\$37.53 per MBTU x 40.141 MBTUs) \$ 1,506.49

TOTAL CHARGES \$ 1,506.49

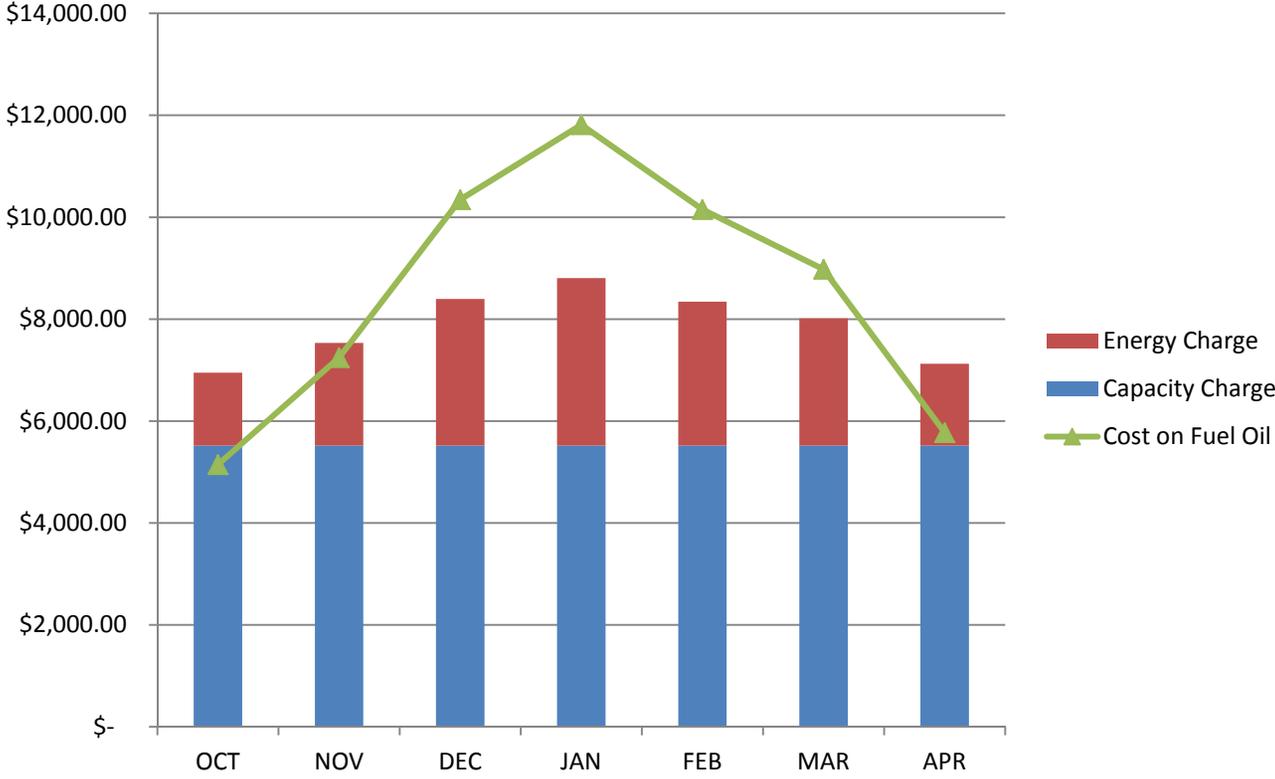
TOTAL		\$ 1,506.49
Invoice #	Amount Now Due	\$ 1,506.49
2014020		

If you have any questions concerning this statement, please call District Heat Montpelier at (802) 223-9500

Location	Previous	Current	MBTUs
City Hall	1409.068	1449.209	40.141

Example Billing: Monthly

Estimated Cost for City Hall/Fire Station



Annual Reporting

- Annual Reports will be developed to include
 - Statement of system functioning and changes
 - Customer roster
 - Actual heating degree days
 - Analysis of energy delivered
 - Peak load analysis
 - System cost analysis
 - State provided information



District Heat Montpelier

First Year Report:

2013- 2014: From Construction to Initial Operation



September, 2014

System Advisory Group

District heating systems, by definition, are community systems. As such, it is in the best interests of all stakeholders to operate and manage the system in a collaborative manner.

- Convene a System Advisory Group to discuss on a quarterly basis
 - Customer education needs
 - Energy efficient improvements
 - Review of system data
 - Review of District Heat Montpelier budget
 - Consideration of system expansion

Questions
