NOTICE

State of Maine Freedom of Access Act (FOAA)

As an appointed member to a board or commission you are a representative of the Town of Cape Elizabeth.

Elected officials and appointed board and commission members (advisory, ad hoc, quasi-judicial) must adhere to the State of Maine Freedom of Access Act statutes (FOAA).

1 M.R.S. §401 Declaration of Intent

"The Legislature finds and declares that public proceedings exist to aid in the conduct of the people's business. It is the intent of the Legislature that their actions be taken openly and that the records of their actions be open to public inspection and their deliberations be conducted openly. It is further the intent of the Legislature that clandestine meetings, conferences or meetings held on private property without proper notice and ample opportunity for attendance by the public not be used to defeat the purposes of this subchapter.

This subchapter does not prohibit communications outside of public proceedings between members of a public body unless those communications are used to defeat the purposes of this subchapter.

This subchapter shall be liberally construed and applied to promote its underlying purposes and policies as contained in the declaration of legislative intent."

What does FOAA cover?

- Public Records

  Written, printed, graphic or electronic records that are in the possession or custody of an agency or official of State or political subdivisions. The records are received, prepared or contain information related to the transaction of public business.

- Public Proceedings

  The transaction of any function affecting citizens by one of the covered bodies including subcommittees and task forces.

Is your social media account a public record? *Yes, if it relates to the transaction of town business whether it is posted from a privately owned computer or not.*

Steps to minimize the risk of your social media account as a public record.

- Include a disclaimer that this is a personal account.
- Do not use your title as a board member.
- Do not solicit "friends" or use contacts gained through your duties as a board member.
- Do not reference your site at public meetings or in any official town documents.
- Do not use your site to gain or disseminate information about official town business.

How does a member of the public provide comment or correspondence to a board? *If someone wants to obtain information, ask questions or provide comments to a board a) they may do so by writing or calling the staff person b) email from the town's website. Emails are directed to the staff person to ensure that the record is forwarded to the board, available for public inspection and that the record is retained as required by statute.*

If I receive an email related to the board I serve on what should I do? *Forward the email to the staff person to make certain the email is shared with the full board, available for public inspection and retained as required by statute.*

If a member of the public asks about a matter pending before the board what should I do? *Advisory committees may share date, time, place, agenda and advise the person they may attend the meeting, provide comments and ask questions, watch the meeting on CETV (if applicable) review meeting materials, review/obtain copies of agendas and minutes. It is appropriate to provide information to help the public in obtaining information and keeping them informed. Boards acting in a quasi-judicial manner should not be discussing matters pending before the board.*

Public Proceedings

1 M.R.S. §402(2)

"Public proceedings" is defined as "the transactions of any functions affecting any or all citizens of the State by any of the following:...
C. Any board, commission, agency or authority of any county, municipality, school district or any regional or other political or administrative subdivision..."

"*Transactions* of any functions affecting any or all citizens of the State..." would not include communicating as to scheduling of meetings, transmitting agendas, minutes, reports or other information gathered by one member to the full board and distributed to board members.

1 M.R.S. §403 Meetings to be open to public; record of meetings

"Except as otherwise provided by statute or by section 405, all public proceedings must be open to the public and any person must be permitted to attend a public proceeding."

Public attendance is not limited to town residents.

1 M.R.S. §406 Public Notice

"Public notice shall be given for all public proceedings as defined in section 402, if these proceedings are a meeting of a body or agency consisting of 3 or more persons..." The reference to 3 or more is the number members of the board, not the number of attendees at the meeting.

The town requires the complete agenda in advance of the meeting to give the public notice of the meeting and topics to be discussed.

Rights of the Public at Meetings

- The public may attend any public proceeding however they may not speak unless the body permits it
- The meeting may be recorded or broadcast but not in a way that interferes with the meeting
- Advance notice of when and where is required even for emergency meetings if practicable
- To challenge in Superior Court the legality of final actions taken in executive session and have the court declare the action null and void

Penalties

- A willful, intentional, or knowing violation of FOAA is subject to a civil penalty of not more than $500
- Class D crime to intentionally remove, alter or destroy public records
- Class E crime to violate the record retention law

Maine Municipal Association
RISK MANAGEMENT SERVICES

Property & Casualty Pool
Automobile Schedule

Member Name: Cape Elizabeth
Certificate Number: P05040PC2015
Coverage Period: 07/01/2015 to 07/01/2016

Year	Make	Model	Vin#	Organization
2005	International	Dump 7400	73523	Public Works
2006	Chevrolet	2500 HD	44709	Public Works
2006	Johnston	Street Sweeper	72046	Public Works
2007	Chevrolet	Silverado 2800HD	62176	Public Works
2008	Chevrolet	Silverado 3500HD	36628	Public Works
2008	International	Dump 7400	79238	Public Works
2009	Chevrolet	Silverado	26417	Public Works
2010	Load-Rite	Utility Trailer	70975	Public Works
2011	GMC	Sierra 1500	18986	Public Works
2011	GMC	Sierra 3500 HD	50746	Public Works
2013	International	7400 Dump	49912	Public Works
2013	Volvo	BL70B Backhoe-registered for road	30212	Public Works
2014	Unknown Manufacturer	Roadway Utility Trailer	03112	Public Works
2015	John Deere	444K Loader	72245	Public Works
2016	International	7400 SFA Plow & Sander	40817	Public Works
2001	International	Bus #3	63845	School
~~2003~~	~~Ford~~	~~F150 Truck~~	~~48629~~	~~School~~
2004	International	Bus #4	80575	School
2004	International	Bluebird #10 School Bus	81260	School
~~2005~~	~~Chevrolet~~	~~Venture Van 7 Passenger~~	~~20414~~	~~School~~
2005	Ford	F150 Truck	68447	School
2006	International	Bluebird School Bus	63042	School
2008	International	Bluebird Bus #5	55483	School
2007	International	IC School Bus #11	77826	School
2007	Pace	American Cargo Trailer	42850	School
2008	International	IC Bus #9	55449	School
2009	International	IC School Bus 77 Pass.	22203	School
2010	Ford	Transit Van	30942	School
2010	GMC	Van	51825	School
2010	International	School Bus	34475	School
2011	International	IC Maxxforce School Bus	81661	School

Remove 2003 Ford F150 Truck 48629 School

Remove 2005 Chevrolet Venture Van 7 Passenger 20414 School

2012 KIA VAN 25796 school

Maine Municipal Association
RISK MANAGEMENT SERVICES

Property & Casualty Pool
Automobile Schedule

Member Name: Cape Elizabeth
Certificate Number: P05040PC2015
Coverage Period: 07/01/2015 to 07/01/2016

Year	Make	Model	Vin#	Organization
2012	International	IC School Bus MaxxForce	13274	School
2013	International	Bus #14	11354	School
2014	Chevy	Silverado 1500 LT	43017	School
2014	[illegible]	IC 3000 School Bus	98887	School
2015	International	IC School Bus MaxxForce	75973	School
2015	International	IC School Bus MaxxForce	75972	School
2017	International	CE School Bus	76453	School
2015	Warren	Whet Transfer Trailer	47016	Transfer Station

Maine Municipal Association
RISK MANAGEMENT SERVICES

Property & Casualty Pool
Inland Marine Schedule

Member Name: Cape Elizabeth
Certificate Number: P05040PC2015
Coverage Period: 07/01/2015 to 07/01/2016

Mobile Equipment

Year	Make	Model/Description	Vin/Serial#	Organization
		Engine One		Fire Department
		Engine Three		Fire Department
		Engine Two		Fire Department
		Forestry One		Fire Department
		Ladder One		Fire Department
		Repeater @ 14 Strout Road		Fire Department
		Rescue One		Fire Department
		Rescue Two		Fire Department
		Voter @ 95 Humphrey Road		Fire Department
		(2) Solar Powered Pedestrian Crosswalk	@ Town Ctr.,	Municipal
		(4) Voting Equipment		Municipal
		18 Portable radios		Municipal
		7 Mobile Radios		Municipal
		Antenna - Spurwink Ave.		Municipal
		Antenna @ 14 Strout Road		Municipal
		Assorted Pipes		Municipal
		Assorted Tools		Municipal
		Energy Management System		Municipal
		ID#29-'05 John Deere Gator #31846	#31846	Municipal
		ID#39-Swenson EVS 100 Hopper for '00		Municipal
		ID#47-Cross Country Trailer #31696		Municipal
		Repeater-Humphrey Road		Municipal
		Repeater-Spurwink Avenue		Municipal
		Sign-Transfer Station		Municipal

Member Name: Cape Elizabeth
Certificate Number: P05040PC2015
Coverage Period: 07/01/2015 to 07/01/2016

Year	Make	Model/Description	Vin/Serial#	Organization
		Ver-Mac LED Message Sign Mdl.PCMS-30		Municipal
		Wacker Plate Compactor		Municipal
		Wet Team Command Van Equipment		Municipal
1972		ID#49-Flexible Sewer Rodder #22353		Municipal
1985		Ag-Rain Watering Machine		Municipal
1993		ID#38-Hopper EV100		Municipal
2002		ID#50-Pequea Trailer #00013		Municipal
2007	Bufco	Bush Hog	M#USHRRB160	Municipal
1997	Case	ID#13 Loader #54386		Municipal
2003	Case	ID#14-Loader 621-D	#35085	Municipal
1990	Cat	ID#2-Loader #2XB01761		Municipal
1997	Caterpillar	ID#3-Grader Mdl.12H	#4XM00724	Municipal
2000	Caterpillar	ID#7-Backhoe w/attachments	s#1WR09314	Municipal
2001	Caterpillar	ID#31-Skid Steer Bucket	02325	Municipal
1995	Holder	Tool Carrier		Municipal
2000	JLG	Sizzer Lift M#33RTS	#176537	Municipal
1988	John Deere	ID#33-Dozer #729292		Municipal
2005	John Deere	ID#24-Mower #20864		Municipal
1989	Kubota	ID#35-Tractor, #10201		Municipal
1996	Kut Kwick	ID#23-Mower, #82526		Municipal
1978	LeRoi	ID#30-Air Compressor #203X300		Municipal
1992	Naiad	18 1/2ft. Inflatable Boat	w/trailer, 90hp	Municipal
1993	Somerset	Transfer Trailer		Municipal
1996	Swenson	ID#34-EV100 Hopper		Municipal
1999	Swenson	EV100 Hoppe		Municipal
2004	Whiteman	ID#44-Cement Mixer #53936		Municipal

Maine Municipal Association
RISK MANAGEMENT SERVICES

Property & Casualty Pool
Automobile Schedule

Member Name: Cape Elizabeth
Certificate Number: P05040PC2015
Coverage Period: 07/01/2015 to 07/01/2016

Year	Make	Model	Vin#	Organization
1930	Seagrave	Pumper	81400	Fire Department
1993	Seagrave	Fire Truck	T2155	Fire Department
1995	Farrara	Pumper	18286	Fire Department
1999	Emergency-One	Fire Truck	09775	Fire Department
2002	Chevrolet	G-Van	03713	Fire Department
2004	Emergency-One	Pumper	08739	Fire Department
2004	Ford	E450 Ambulance	23750	Fire Department
2005	American	SCBA Trailer	10829	Fire Department
2006	GMC	1Ton K3500	28750	Fire Department
2007	Ford	F550	55583	Fire Department
2011	GMC	Ambulance	76236	Fire Department
2015	Chevrolet	Tahoe	45376	Fire Department
2001	International	Tractor Truck	70642	Municipal
2005	STEC	Transfer Trailer	54065	Municipal
2008	Chevrolet	Silverado 2500HD	43645	Municipal
2011	Unknown Manufacturer	Ventura Boat Trailer	00134	Municipal
2013	John Deere	ID#25-1445 Mower-PW-registered for road	30812	Municipal
2014	Kubota	Utility Vehicle RTV 900 XT-Parks	E4766	Parks & Recreation
2016	Roadway	Utility L7X20	00658	Parks & Recreation
2011	Ford	Crown Victoria	57057 ✓	Police
~~2011~~	~~Ford~~	~~Crown Victoria~~	~~57058~~	~~Police~~
2013	Ford	Police Utility w/equipment	31196 ✓	Police
2013	Ford	Explorer	40554 ✓	Police
2014	Ford	Explorer	90894 ✓	Police
2014	Ford	Explorer	90893 ✓	Police
2015	Ford	Explorer w/equip	66907 ✓	Police
1996	IHC	ID#1-Dump Truck	04200	Public Works
2000	International	Dump 2554 (t)	42814	Public Works
2000	International	Dump 2554	66092	Public Works
2004	International	Dump 7400	14554	Public Works
2005	International	Tank 4300	89912	Public Works

Priority 1 and 2 Recommendations

Number	Priority	Location	Description	Material Cost	Labor Cost	Total Cost	Grant or Efficiency Maine Rebate	Total Net Cost	Annual BTU's Saved	Annual KWH Saved	Fuel Switching Savings	Annual Savings	Simple Payback, Years	Comments
A3	P1	All Buildings	Energy Consulting Services	$50,000	incl	$50,000		$50,000				$0		wind turbine, eval & analysis, solar thermal analysis, waste water ground source heat pump....
F1	P1	Fire Station	Lighting											
H1	P1	High School	Lighting (included above)											not included in Efficiency Maine grant
H2	P1	High School	Insulation	$55,372	incl	$55,372	$0	$55,372	441,148,385					Awarded Efficiency Maine Grant
H3	P1	High School	Class Rm UV / CO2 Occupancy sensor Sensor	$22,000	$18,000	$40,000	$625	$39,375	220,000,000	7,000		$7,878	7.0	CM3 estimate
H4	P1	High School	CO2-VFD Library HS	$2,500	$1,500	$4,000	$1,700	$2,300	42,000,000	7,204		$4,979	7.9	
H5	P1	High School	CO2-VFD GYM	$7,620	$11,500	$19,120	$0	$19,120	180,000,000	9,000		$1,831	1.3	
H7	P1	High School	Oil boilers replacement	$335,000	incl	$335,000	$0	$285,000	2,324,000,000			$4,564	4.2	3 boilers @ 5.5 mmBtu, dual fuel capable, exist blrs, oversized, inefficient, at end of usefule life
M3	P1	Middle School/PC Cove	Occupancy Sensors for 28 rooms (variable air volume (VAV)	$6,000	$9,500	$15,500	$700	$14,800	14,000,000	13,500		$40,670	7.0	
M4	P1	Middle School/PC Cove	Occupancy Sensors for 84 rooms	$9,000	$11,000	$20,000	$2,100	$17,900		18,000		$2,275	6.5	28 rooms
M5	P1	Middle School/PC Cove	VFD Heat Recover Units	$25,000	$20,000	$45,000	$15,000	$30,000	294,000,000	45,300		$2,700	6.6	
M6	P1	Middle School/PC Cove	AHU 1,2,7, VFD upgrade	$6,000	$6,000	$12,000	$4,060	$7,940		16,000		$12,045	2.5	
M7	P1	Middle School/PC Cove	CO2-VFD Middle School GYM	$2,500	$4,000	$6,500	$1,700	$4,800	128,000,000	4,300		$2,400	3.3	
PW1	P1	Public Works	Insulation	$2,624	$2,624	$5,247	$0	$5,247	31,060,465			$2,931	1.6	
T2	P1	Town Hall	Insulation	$3,525		$3,525		$3,525	21,137,167			$555	9.5	
TS1	P1	Transfer Station	Insulation	$2,000		$2,000		$2,000	11,978,610			$377	9.3	
H8	P1	High School	Natural Gas Extension	$400,000	incl	$400,000	$0	$400,000	approx 20% fuel cost savings			$214	9.4	estimate for operator room
H9	P1	High School	NG Extension + New NG Boiler	$402,000	$0	$402,000	$0	$402,000	11,978,610		$53,360	$53,360	7.5	SWAG on pipeline extension cost, still waiting on Unitil
			Miscellaneous Priority 1					$107,476						SWAG on pipeline extension cost, still waiting on Unitil
Subtotal Priority 1				**$1,331,141**	**$84,124**	**$1,415,264**	**$25,885**	**$1,446,855**	**3,719,303,236**	**120,304**	**$53,360**	**$190,138**	**7.6**	
F2	P2	Fire Station	Controls	$8,520	$12,800	$21,320		$21,320	121,953,013			$2,178	9.8	station not connected to control system, control boile set point based on ousuide air, library to be excluded for now
L2	P2	Library	Controls	$2,900	$4,360	$7,260		$7,260	41,528,090			$742	9.8	replace outdated control panel
M2	P2	Middle School/PC Cove	Insulation	$3,094	$3,094	$6,188		$6,188	18,100,000			$323	19.1	CM3 estimate
M9	P2	Middle School/PC Cove	Controls Upgrade	$9,120	$13,680	$22,800		$22,800	82,909,091			$1,481	15.4	CM3 estimate on savings
H6	P2	High School	Controls	$9,060	$13,590	$22,650	$0	$22,650	128,121,212			$2,288	9.9	CM3 estimate on savings
PS1	P2	Police Station	Insulation	$818		$818		$818	4,337,879			$77	10.6	insulate around chimney, CM3 estimate
T3	P2	Town Hall	Controls	$2,900	$4,360	$7,260		$7,260	41,528,090			$742	9.8	
			Miscellaneous Priority 2					$17,659						
Subtotal Priority 2				**$36,412**	**$51,884**	**$88,296**	**$0**	**$105,955**	**438,477,375**	**0**	**$0**	**$7,830**	**13.5**	
Subtotal Priority 1 and 2 Combined				**$1,367,553**	**$136,008**	**$1,503,560**	**$25,885**	**$1,552,810**	**4,157,780,611**	**120,304**	**$53,360**	**$197,968**	**7.8**	

Priority 3 Recommendations

Number	Priority	Location	Description	Material Cost	Labor Cost	Total Cost	Grant or Efficiency Maine Rebate	Total Net Cost	Annual BTU's Saved	Annual KWH Saved	Fuel Switching Savings	Annual Savings	Simple Payback Years	Comments
H10	P3	High School	Biomass / Pellets /Boiler	$700,000	incl	$700,000		$700,000	9,210,000,000		$125,882	$125,882	5.6	Building addition required, see if NG can be brought to Town center first, CM3 estimate
H11	P3	High School	Geothermal HP System	$4,000,000	incl	$4,000,000		$4,000,000				$131,000	30.5	expensive to install in existing buildings, CM3 estimate
H12	P3	High School	Solar Thermal	$85,000	incl	$85,000	$47,500	$37,500	210,000,000			$3,750	10.0	for domestic hot water, grant value assumed to make numbers work
H13	P3	High School	Cogeneration	$1,400,000	incl	$1,400,000		$1,400,000	0		$0	$0	#DIV/0!	re-evaluate if Nat gas is made avaialable, gas needs to be around $10/mmBtu before cogen options begins to make sense at current elc prices
H14	P3	High School	Wastewater ground source heat pump			$0								not enough data available
H8	P1	High School	Natural Gas Extension	$400,000	incl	$400,000	$0	$400,000	approx 20% fuel cost savings			$53,360	7.5	SWAG on pipeline extension cost, still waiting on Unitil
H9	P1	High School	NG Extension + New NG Boiler	$400,000	$0	$400,000	$0	$400,000	0		$53,360	$53,360	7.5	SWAG on pipeline extension cost, still waiting on Unitil
A2	P3	School Buildings	660 kW Wind Turbine	$2,000,000	incl	$2,000,000	$100,000	$1,900,000		867,821		$130,173	14.6	capacity factor depend son wind resource, collecting data now

Savings From Recent Energy Conservation Measures

Energy Conservation Measure	Year Implemented	# Fixtures	Watts Per Old fixture	Watts Per New Fixture	Watts decreased Per Fixture Per Hour	kWH savings	Fixtures Cost	Labor Cost to Install	Efficiency Maine Rebate	Net Up Grade Cost to Cape Elizabeth	Annual Cost Savings	Simple Payback	Annual CO2 Emission Prevented, Tons	Comments
High School Gym Lighting	2008-2009	30	458	361	97	8,928	6,400	1,600	$4,500	$ 3,500.00	$ 1,315.08	2.7	4.58	
Middle School Gym Lighting	2008-2009	16	465	361	104	3,375	3,406	1,500	$2,400	$ 2,506.00	$ 497.08	5.0	1.73	
Pond Cove Gym Lighting	2008-2009	6	458	361	97	1,180	1,295	300	900	$ 694.50	$ 173.86	4.0	0.61	
Middle School Cafeteria Lighting	2008-2009	8	458	361	97	1,574	1,969	400	$1,200	$ 1,169.00	$ 231.81	5.0	0.81	
Richards Pool Lighting	2008-2009	28	923	361	562	88,373	14,224	1,400	4200	$ 11,424.00	$ 13,017.40	0.9	45.38	
Public Works Garage Lighting	2008-2009	41	300	241	59	9,057	6,816	2,050	3,075	$ 5,791.00	$ 1,334.06	4.3	4.65	
Town Center Fire Lighting	2008-2009				0	0				$ -	$ -		0.00	
Town Hall Lighting	2008-2009				0	0				$ -	$ -		0.00	
Classroom Upgrades (Zoning, Occupancy Control)	2009					10,000	26,400	13,200	$ -	$ 39,600.00	$ 6,500.00	6.1	5.14	
Middle /High School Coolers (Hi Efficiency Motors Controls)	2009		need data			17,690	3,170	3,170	$ 2,650.00	$ 3,690.00	$ 2,605.74	1.4	9.08	
Fire Station Economizer	2009		need data							$ -			0.00	
Town Hall Boiler Replacement	2007		need data							$ -			0.00	
Lighting All Buildings	2010					280,881		136,412	$ 85,000.00	$ 51,412.00	$ 42,132.00	1.2	144.23	Eff maine Award, work scheduled in 2010
													0.00	
TOTAL						421,058	$ 63,679.50	$ 160,032.00	$ 103,925.00	$ 119,786.50	$ 67,807.01	1.8	216.21	

2011 Approved Town of Scarborough Energy Plan – June 1, 2011

Vision Statement: This Comprehensive Energy Plan will guide the Town of Scarborough toward an energy management system that is financially and environmentally sustainable.

Executive Summary:

This is the first phase of a recommended energy efficiency STRATEGY plan for the Town of Scarborough. The Standing Energy Committee believes these STRATEGIES will benefit the residents, businesses, and the municipality (the Stakeholders) by saving money on energy bills, improving the likelihood of energy security as well as reducing the impact of fossil fuels on the environment. The following STRATEGIES are recommended for consideration by the Scarborough Town Council:

1. Establish the Energy Office
2. Implement conservation measures
3. Continue and improve Benchmarking
4. Implement the Integrated Energy Model
5. Continue and Expand Education and Outreach

Each of these recommended STRATEGIES is described in greater detail in the following sections.

Implementation

The Standing Energy Committee has reviewed the available information and options available to the Town of Scarborough. It is the recommendation of the Committee that the Town of Scarborough continue to monitor energy usage and implement efficiency efforts in municipal facilities while the Town explores all avenues to reduce energy usage and costs.

Future STRATEGYs

Future phases of the STRATEGY plan will be updated with new information and ongoing discussions with stakeholders in the community (municipal, residential, and business) and may include additional recommendations.

Background

In August of 2005 the Council, in response to the world energy crisis with resultant increases in fuel and electricity prices, directed the then Town Manager, Ron Owens, to form an Energy Savings Task Force, consisting of staff members. The committee's charge was to review the energy use patterns of the Town departments and to present to the Council recommendations to consider to reduce the municipality's carbon footprint and to keep the cost of fuels within budget constraints whenever possible.

The committee reached out to Efficiency Maine of the PUC (Public Utilities Commission) requesting an energy audit for the municipal buildings in Scarborough. Even though they had not conducted energy audits for municipalities before, they agreed to perform two audits for the town of Scarborough. Two of the Town's buildings were audited – Town Hall and Public Works (See addendum "A" for detailed report).

The 2005 Task Force summarized the audits & identified major focus areas as follows:

1. Vehicle Idling policy.
2. Use of Biodiesel vehicles.
3. HVAC and domestic Hot water systems.
4. Insulation and winter proofing efforts.
5. Re-lamping and lighting issues.
6. Education of employees in all departments.

Throughout the review of energy issues in 2005, the task force had to consider which items could be accomplished within the current budget and which would need a 3 to 5 year phased approach. Items that were considered for inclusion in the CIP budget process were re-lamping, purchasing fuel efficient vehicles, etc.

The Town Manager submitted this summation report to the Council on August 4, 2006 (See addendum "B"). In May of 2009 the Council formed the Ad-Hoc Energy Committee. Between 2006 and 2009, however, the town continued to make progress on the audit's recommendations.

All members of the 2009 Ad-Hoc Energy Committee received: copies of the 2005 audit information, the Town Manager's reports of August 2006, and the Resolution 09-06. The Ad-Hoc Energy Committee discussed these materials as well as the priorities and strategies for the town. One conclusion was the value of the benchmark data for the Town's facilities. The Ad-Hoc Energy Committee presented a draft report of their recommendations to the Council in early 2010. (See Addendum "C")

The result of the work of the Ad Hoc Energy Committee was the establishment by the Council of a standing Energy Committee. This was a demonstration of the importance of energy issues to the future of Scarborough and of the Town's sustained commitment to these issues.

Goal based Recommendations:

1. Scarborough Energy Office

STRATEGY: Establish an Energy Office as clearing house for all seeking information on energy and energy efficiency directing them to appropriate entities.

With the support of the standing Energy Committee, this office will have the following roles and responsibilities to promote the implementation of Scarborough's Energy Plan:

1. Monitor and report on energy benchmarks for all departments.
2. Serve as liaison with the State on energy issues and take the lead on researching and submitting grants for federal, state and county programs.
3. Create and coordinate an educational outreach program for the community on energy matters.
4. Coordinate asset management for the Town to maximize the cost effective energy saving activities for the community.

2. Conservation:

STRATEGY: Review and implement efficiency upgrades for the municipal and school building infrastructure.

STRATEGY: Take advantage of long term savings with the implementation of energy producing and conserving methods when constructing new buildings and renovating existing buildings.

A. **Transportation** - The major goal in the transportation arena is to reduce greenhouse gas emissions and energy use in both the municipal and private sector in the Town of Scarborough. According to a 2008 report by the Maine Department of Environmental Protection, "the transportation sector accounts for roughly 40% of Maine's greenhouse gas emissions." (p. 8, January, 2008, " Second Biennial Report to the Natural Resources Committee, PL 2003, Chapter 237, Progress Toward Greenhouse Gas Reductions Goals.)

STRATEGY: Review the 2005 Town Wide Transportation Study and Regional East/West Corridor Study recommendations for applicability to the goals of the Energy Plan. The energy committee will recommend priority projects that meet the goals of this plan.

STRATEGY: Establish alternative modes of transportation by contracting with the local transit systems currently in existence.

STRATEGY: Establish "park and ride" lots to encourage car/vanpooling.

STRATEGY: Promote non-motorized travel by incorporating sidewalks and paths, construction of adequate space for bike travel as we renovate our roads and increasing crosswalks and thus slowing auto traffic.

STRATEGY: Monitor and implement the recommendations of the Oakhill Pedestrian Plan.

B. **Land Use and Codes** – Codes and policies that govern the potential use of land and the focus of development can greatly affect community energy usage.

STRATEGY: The Energy Committee will work with other Town boards and committees to develop policies and strategies that reduce car-dependence by strengthening existing growth areas of the Town, and preserving rural areas.

3. Measure Success:

Benchmarking is an on-going assessment of energy and environmental metrics. The change in these metrics over time allows for the evaluation of programs and projects to determine the level of increase in energy efficiency and reduction of greenhouse gas emissions. Establishing benchmarks is the most important activity in determining efficacy.

STRATEGY: Compile energy metrics for each Town and School facility for the last three years, and maintain them indefinitely as the plan is implemented.

STRATEGY: Install building automation systems and sub-metering strategies for all municipal and school facilities. These systems will provide the infrastructure for monitoring, measuring, and verifying the achievement of the goals of the energy plan, as well as providing operational system optimization.

STRATEGY: Develop Municipal vehicle and "over the road" equipment metrics regarding energy usage.

STRATEGY: Review and update procurement policy and specifications to reflect energy reduction goals for energy reduction through procurement.

STRATEGY: Benchmark municipal solid waste and recycling. Evaluate changes from the base year.

STRATEGY: Benchmark residential/community solid waste and recycling. Evaluated changes from the base year.

STRATEGY: The Energy committee, in conjunction with the Sustainability Coordinator, shall prepare an annual report for the Town Council that outlines progress and delineates goals for the next year.

4. Education and Outreach

Education and outreach is a part of ensuring a sustainable energy plan for the community on all levels. Because education and outreach are ongoing processes of collaboration with community members (residents and business owners), these activities will be implemented by the Energy Office with support from the Energy Committee (See Number 1.)

STRATEGY: Establish ongoing in-house education for the Council, Department Heads, and staff on energy initiatives, policy and planning.

STRATEGY: Establish trainings and resources focused on the particular needs of residents, businesses to deal with energy issues in a more sustainable way.

STRATEGY: Keep up to date by establishing strong relationships with organizations that can inform and support the Town's energy goals. Pursue opportunities for partnering with these organizations.

STRATEGY: Develop a basic education and outreach program which can be presented to the council, department Heads and employees of the Town as well as local businesses, rate payers, and other Stakeholders.

STRATEGY: Utilize media to disseminate energy efficiency information on a regular basis.

STRATEGY: Place the Energy Office on the Town website where information and contact information can be available to citizens.

5. Cost Reduction:

The Energy Committee, in conjunction with staff, will actively research opportunities for achieving the goals of this plan through purchasing wholesale power, funding tri-gen facility opportunities, and/or other potential cost saving/energy usage reduction technologies. The two major components of Cost Reduction are 1) to buy power at cheaper rates, and 2) create power generation capacity to reduce the Town's reliance on market sources. These strategies combined will serve to reduce significantly the Town's energy costs.

STRATEGY: Establish "Scarborough Energy Cooperative, LLC" as the entity to implement an Integrated Municipal Energy Model to reduce costs, to monitor electrical supply options, and to negotiate favorable rates for the purchase of or resale of excess energy. The further goal of this entity will be to monitor, explore and augment energy sources with renewable or alternate forms of energy, as they become available.

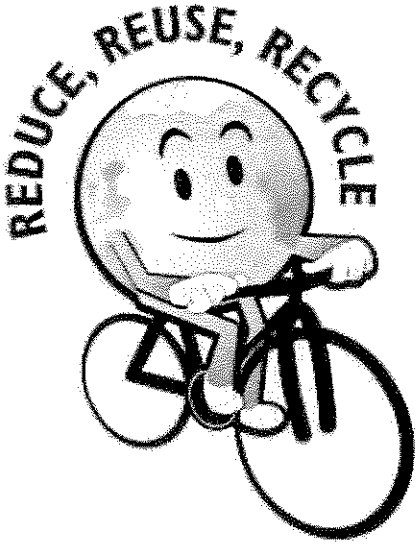
The Integrated Municipal Energy Model (See Addendum "C") is an example of a new entity, "Scarborough Energy Cooperative, LLC," that may be created to purchase wholesale electricity and generate thermal energy locally to resell to customers in Scarborough. Preliminary modeling suggests that this approach will be cost effective when there is an appreciable difference between wholesale electric rates and the Standard Offer. Efforts must be made to establish inter-municipal cooperation for the Energy Supply Group. Sensitivity should be given to the political ramifications of such an arrangement. A portion of the cost savings realized will be returned to customers in the form of

reduced supply costs with the remainder being used by the cooperative to fund projects consistent with the vision of financially and environmentally sustainable energy management.

STRATEGY: Establish a tri-gen facility for the Oak Hill municipal campus, sized to meet the combined heating and cooling loads of Town Hall, Scarborough High School, Wentworth Intermediate School, Scarborough Middle School, Scarborough Public Library and perhaps adjacent businesses. This will be a demonstration project for the municipality.

Tri-generation (tri-gen) facilities (see figure 1, Addendum "C") are a well-established approach for the combined generation of (1) electricity and (2) heat or (3) cooling near the point of use. Conventional energy generation involves burning fuel at large power plants located at a distance from the cities and towns that use the electricity. These plants typically have large cooling towers to disperse waste heat. Additional losses occur as the electricity travels from the point of generation to the point of use. Individual buildings then have boilers or furnaces on site to generate heat. Tri-gen facilities are imbedded in the communities they serve so that steam generated as a byproduct of electricity generation can be used to heat nearby buildings during the winter or to cool them during the summer (through the use of absorption chillers). The EPA estimates that combined generation of heat and power can reduce fuel consumption by ~1/3, resulting in substantial savings to the energy customer and substantial decreases in greenhouse gas emissions.

Final Report on Reducing Municipal Solid Waste (MSW)



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1. Ongoing Education and Outreach.
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   - Establish drop-off sites for household organic waste.
3. Hire part-time Sustainability Coordinator.
4. Evaluate next phase recommendations, including but not limited to:
   - PAYT options.
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The Energy Committee has reviewed the data on our existing recycling program and finds that there is room for improvement. Data from EcoMaine indicates that we achieved a recycling rate of 36.1% in FY08, the first full year of curbside, single stream recycling. Since that time, the recycling rate has declined with a low of 31.43% in FY12-13, a recent high of 33.55% in FY14-15 and a four-year average of 32.19%. (Data from EcoMaine. http://www.ecomaine.org/about-ecomaine/ecomaine-communities/scarborough/)

During the first year of curbside recycling a half-time employee (funded through grant monies) coordinated education and outreach efforts. While EcoMaine has engaged in ongoing educational activities in the Scarborough Schools and through the media, the Town of Scarborough has not conducted ongoing outreach efforts.

The 2011 Maine Residential Waste Characterization Study (http://umaine.edu/wcs/ and personal communication with the authors) found that 19% of the Scarborough MSW stream is recyclable (12.8% paper, 4.2% plastic, 2.0% metal) and that 41% of the MSW stream is compostable (25.2% food, 10.5% non-recyclable paper, 5.3% leaves/grass).

The Energy Committee has projected the results of the Waste Characterization Study onto the FY15 Scarborough Waste Stream as reported by EcoMaine. Approximately 1000 tons of additional recycling and 2000 tons of compostable materials are targets for increased diversion.

Pay-As-You-Throw

While the initial community response to a Pay-As-You-Throw program was negative, the Energy Committee does recommend an open community process to explore this option further. The experience of many other communities indicates that an initial negative reaction is very common and that a 6-9 month period of community education is necessary to address concerns and misconceptions prior to community acceptance. Surveys of communities with active PAYT programs generally find better than 90% support of the program.

A review of the literature indicates that volume based pricing does reduce the MSW stream, but the magnitude of the effect depends on the recycling and waste patterns in place at the start of the program. While many communities use a bag style PAYT program as presented by WasteZero, other communities allow households to choose the size of their trash cart and then bill based on the size of the cart. The city of Asheville, NC hired SERA (sera.inc) to compare these options. SERA analysis indicated that a bag program would cost the community more over time that the upfront costs associated with replacing some carts with new sizes. The complete report is available on the Asheville web page (www.ashevillenc.gov/Portals/0/city-documents/economicdevelopment/ped/Skumatz%20Economic%20Research%20Associates%20(SERA)%20Asheville%20PAYT%20Options%20Analysis%20Report.pdf)

The Energy Committee recommends an open community process to evaluate PAYT options (and universal curbside composting options, discussed below). This process would involve additional research, community education and outreach and a series of community forums to address concerns and take community input before developing detailed recommendations.

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additional 191 tons would have been recycled during FY 14/15 for a savings of $13,465 in avoided tipping fees.

We also recommend that the Town of Scarborough make increased efforts to lead by example. We recommend providing recycling bins at all municipal facilities and events.

Compostable Organics

Compostable organic materials can be removed from the MSW stream through backyard composting, subscription curbside composting, development of centralized drop-off sites, and/or implementation of a universal curbside composting program.

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This position could overlap with the Energy Coordinator position recommended in the 2011 Scarborough Energy Plan. This position was requested to provide education and outreach on energy issues and to identify new opportunities and grants for the town.

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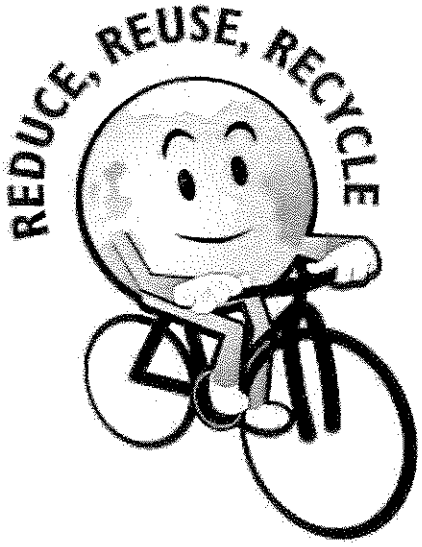

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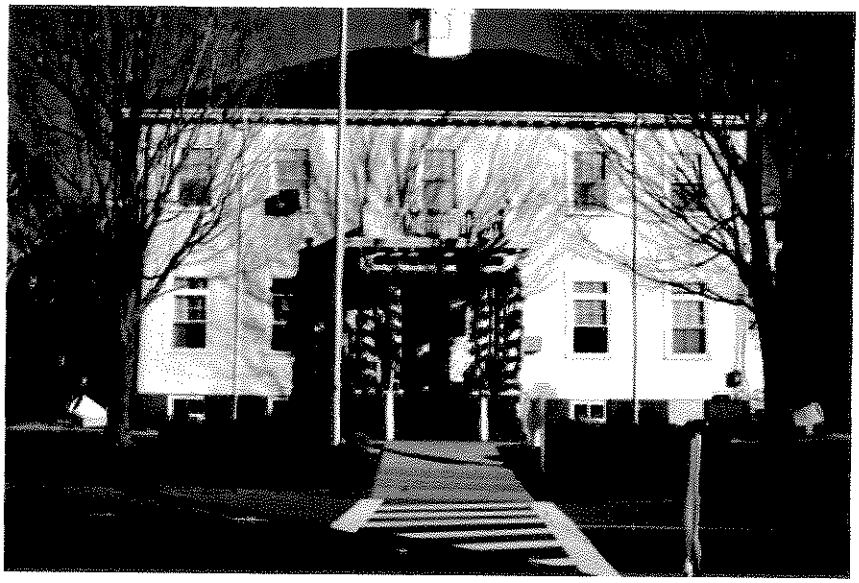
CAPE ELIZABETH TOWN HALL

HEATING SYSTEM SURVEY



Prepared by

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December 31, 2010

TABLE OF CONTENTS

EXECUTIVE/ SUMMARY

The Cape Elizabeth Town Hall suffers problems with comfort conditions due to the nature, control, zoning and cycling of the existing steam heating system. Steam heating systems of this age have exceeded their recommended service life and are generally recommended for replacement. The oil consumption for this system is unusually low, due to the energy efficient control and lack of mechanical ventilation systems in the building. Although the building does not have mechanical ventilation systems as required by current codes, ventilation was not mentioned as a problem area. Air conditioning is through small window or thru-wall units. There are no central air conditioners as are typical in many town halls in southern Maine. The existing electrical service to the building is small and single phase, which limits the ability to add air conditioning and mechanical ventilation. Where as it may be possible to add central ventilation without an electrical service upgrade, an upgrade would be required to accommodate significant additional or central air conditioning.

We recommend that the Town utilize this report as the starting point to develop a plan for maintaining and upgrading the building heating, ventilating and air conditioning systems. We would be happy to meet to discuss the report and potential options.

The base option ($30,000) could provide improvement to heating comfort conditions in most areas. This option would upgrade temperature controls throughout the building to direct digital controls and add valves to provide individual room zoning. The controls could be programmed to only cycle the boiler on a call for heat from any particular zone or combination of zones. Therefore, zones requiring heat would receive heat and zones not requiring heat would not overheat although there would still be some delay and overshoot.

Other options as detailed in this report begin to phase in conversions to hot water heat, addition of incremental or central ventilation, and central air conditioning. The general budget ranges for these options are from $150,000 to $400,000. This does not include an upgraded electrical service.

Whereas we would not normally recommend putting additional money into an existing steam system of this age, it appears that in this case, with the low oil consumption, and the higher cost for alternative systems, the base option is justified to provide comfort within the building. We also recommend beginning to budget money for eventual system upgrade and replacement.

INTRODUCTION

In the end of October 2010, we were contacted by Ernie MacVane to perform a Heating System Survey for the Cape Elizabeth Town Hall. Over the past two months we have visited the site four times, walked the building with Ernie, met with Dave Clay of Mechanical Services, Inc., the HVAC service contractor for the building, reviewed plans and specifications, and done various calculations to assist in putting this report together. This report represents the conclusion of these efforts.

Existing Building

The building is a wood frame structure reportedly built around 1901 with a full basement. It was reported that the building was originally half fire station and half school, and that the current Council chambers was originally a gymnasium. The building has two floors above grade and is a split-level with the front section being higher than the rear section. The building footprint is about 6,000 SF per floor, and 2½ floors are occupiable for a total occupiable square footage of about 15,000.

Existing Heating Systems

The existing heating systems are low pressure steam, two pipe, dry return, with a condensate receiver pump set located in the Boiler Room. Although there have been two boilers in the past, there is currently only one boiler that generates low pressure steam which is distributed through steam pipes to the various cast iron radiators located throughout the building. Steam traps on the leaving side of the radiators allow condensate to pass into the return piping but prevent the steam from passing through. The condensate flows back through pipes by gravity to the Boiler Room where it is collected by the condensate receiver pump set and then pumped back to the boiler by a level activated pump. Typically these systems maintain a steam pressure level of 2 to 5 pounds during the heating season; however, this system has been modified in order to save energy and currently produces steam only upon a call for heat from any of the five major heating zones. In these zones, on a call for heat from the respective thermostat, the corresponding zone valve located in the Boiler Room opens and an end switch senses when the valve is open and then allows the boiler burner to fire and creates steam.

When the zone is satisfied, the circuit is broken and the boiler cycles off. This is a legitimate energy savings strategy although it may produce problems with leakage between boiler sections due to the expansion and contraction of the cast iron boiler caused by intermittent cycling of the burner during the shoulder season.

Heat loss calculations indicate that the boiler is significantly larger than necessary to heat the building. Fortunately, the boiler is large enough to temper mechanical ventilation if it should be added to the building.

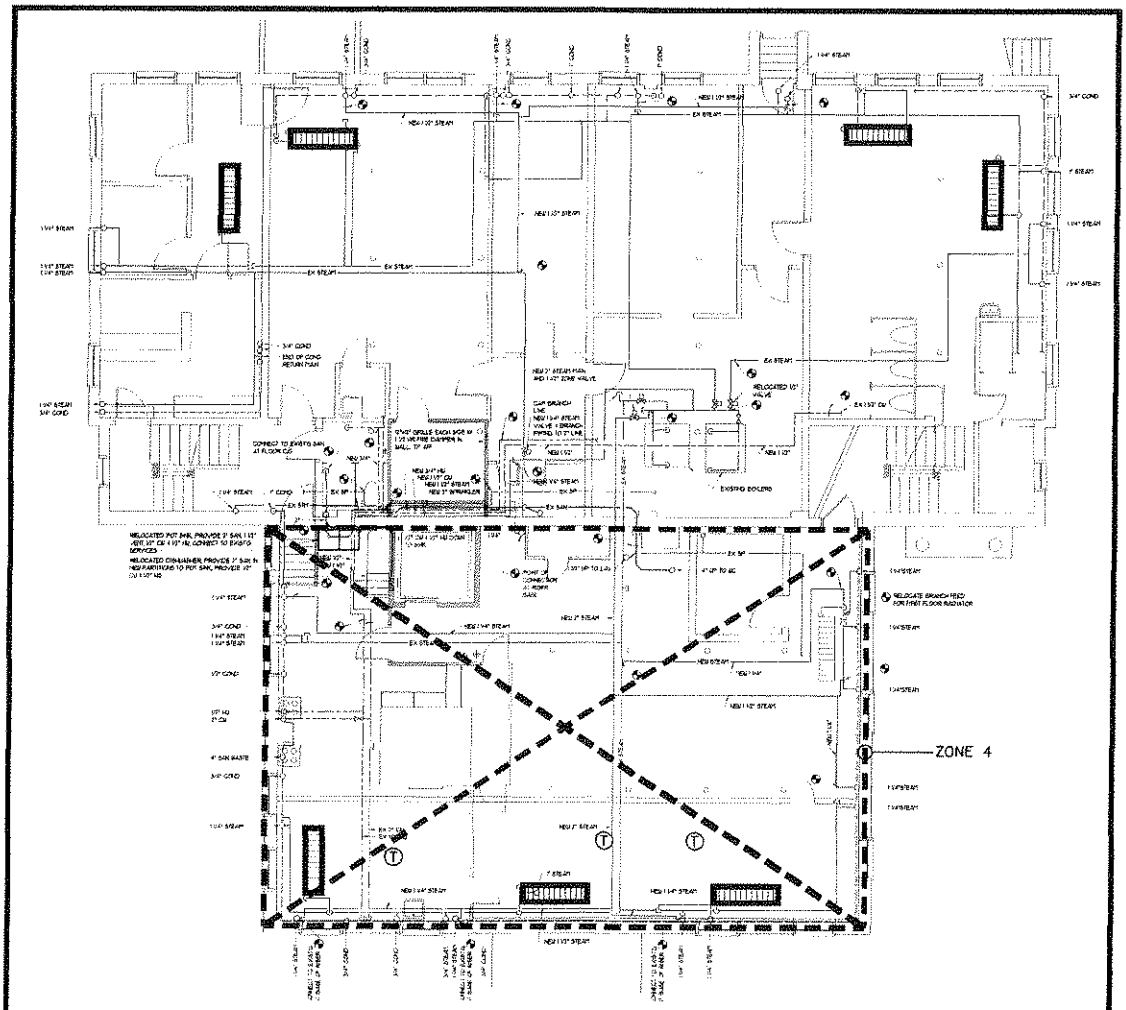
Automatic temperature controls are a combination of old electric controls and new direct digital controls. The five major heating zones are shown on the following floor plans. There are several sub-zones which are controlled by self-contained thermostatic valves or thermostat activated control valves which can only open on a call for heat and close when heat is satisfied. The sub-zones do not have the ability to activate the boiler steam system. It appears that partitions have been added and/or removed so that thermostats are not always located in a location appropriate for the radiation they are controlling.

There are numerous comfort complaints throughout the buildings and reports of being too hot, too cold, or oscillating between the two extremes. This is not surprising with the current steam system, the combination of controls and the location of thermostats relative to the radiation control.

The existing steam heating system may have been the heating system installed in the original building. At any rate, it appears to be at least 50 years old and the existing piping and radiators are nearing the end of their useful service life. Steam systems are especially prone to corrosion due to the fact that air is carried in the pipes as well as water in both vapor and liquid phase. Many of the temperature control valves are old and in need of replacement, and the various control components do not make for an integrated control system.

Steam is inherently much more difficult to control than hot water heat and prone to producing broader swings in temperatures. The current oil consumption for this building is very low due to the effective control strategy and the lack of mechanical ventilation. Unfortunately, comfort conditions are far from ideal.

Basement Plan



BASEMENT PLAN

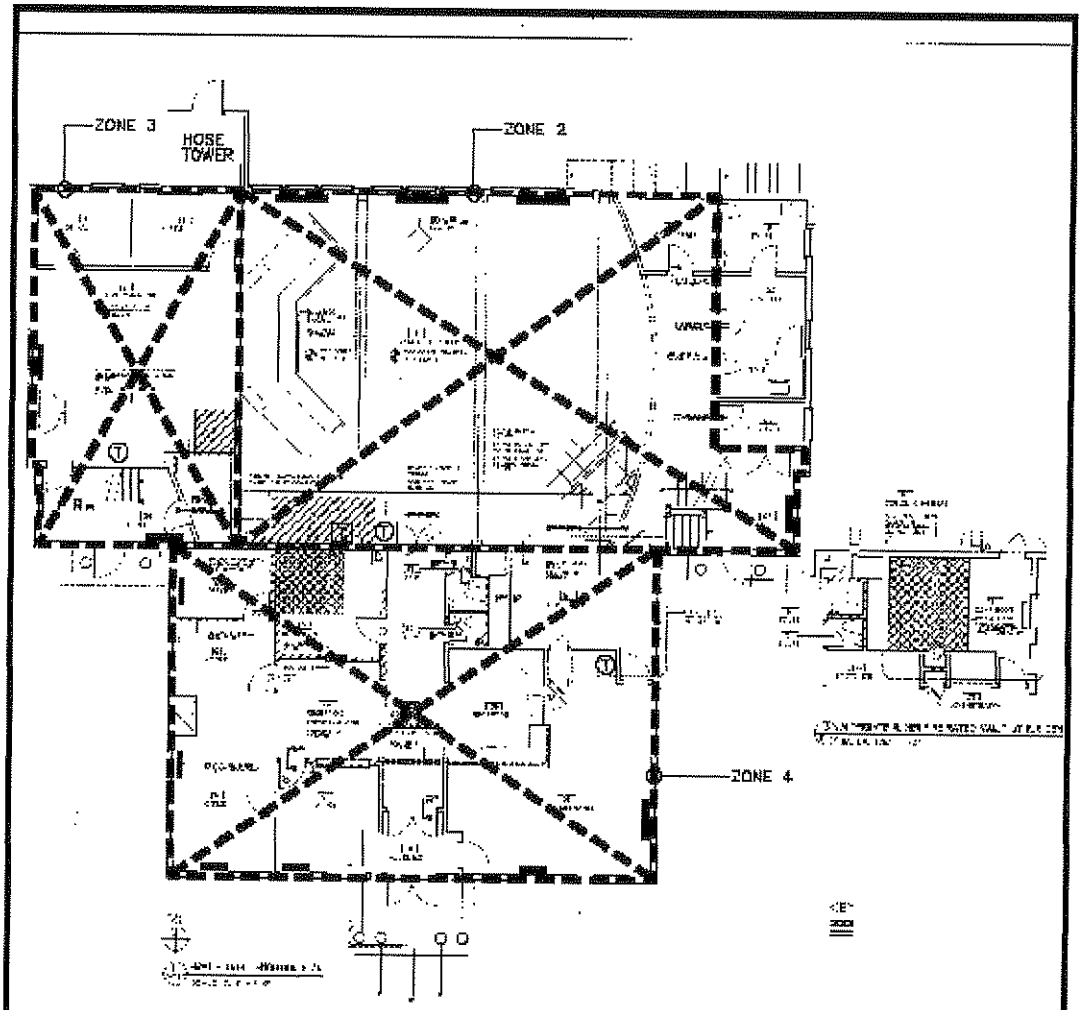
NOT TO SCALE

THIS DRAWING IS FOR GENERAL INFORMATION ONLY.
ROOMS AND HEATING SYSTEMS ARE NOT UP TO DATE.

CAPE ELIZABETH TOWN HALL
HEATING SYSTEM SURVEY

RUSSELL A MARTIN, PE, PA
DECEMBER 31, 2010

First Floor Plan



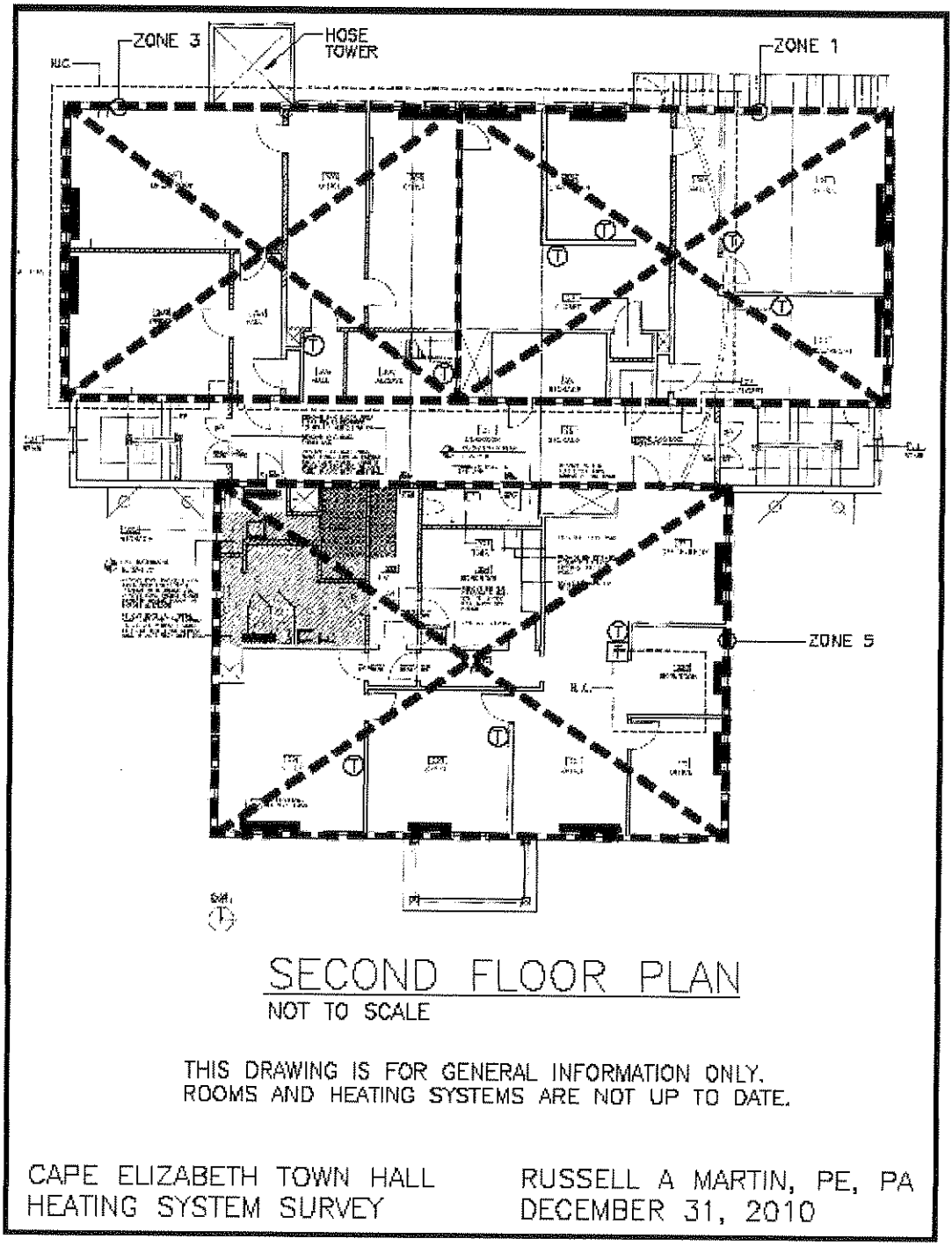
FIRST FLOOR PLAN
NOT TO SCALE

THIS DRAWING IS FOR GENERAL INFORMATION ONLY.
ROOMS AND HEATING SYSTEMS ARE NOT UP TO DATE.

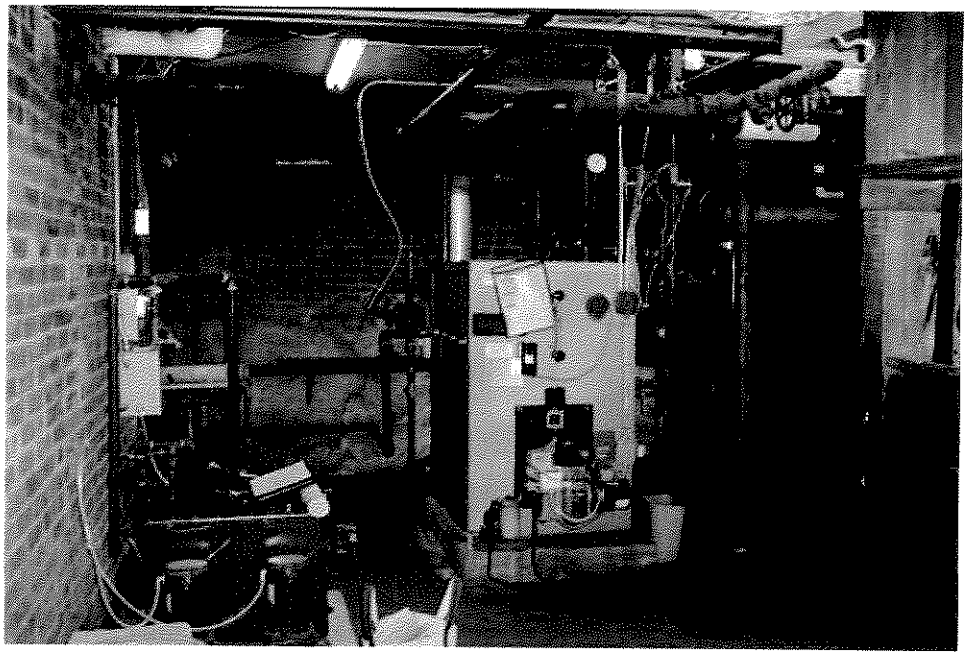
CAPE ELIZABETH TOWN HALL
HEATING SYSTEM SURVEY

RUSSELL A MARTIN, PE, PA
DECEMBER 31, 2010

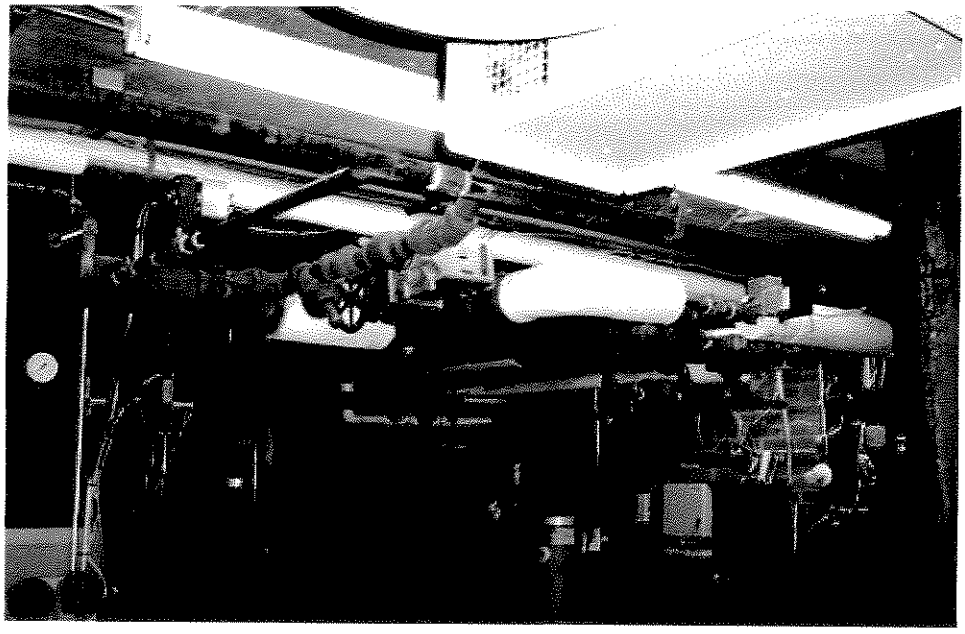
Second Floor Plan



Photos of Existing Heating Systems

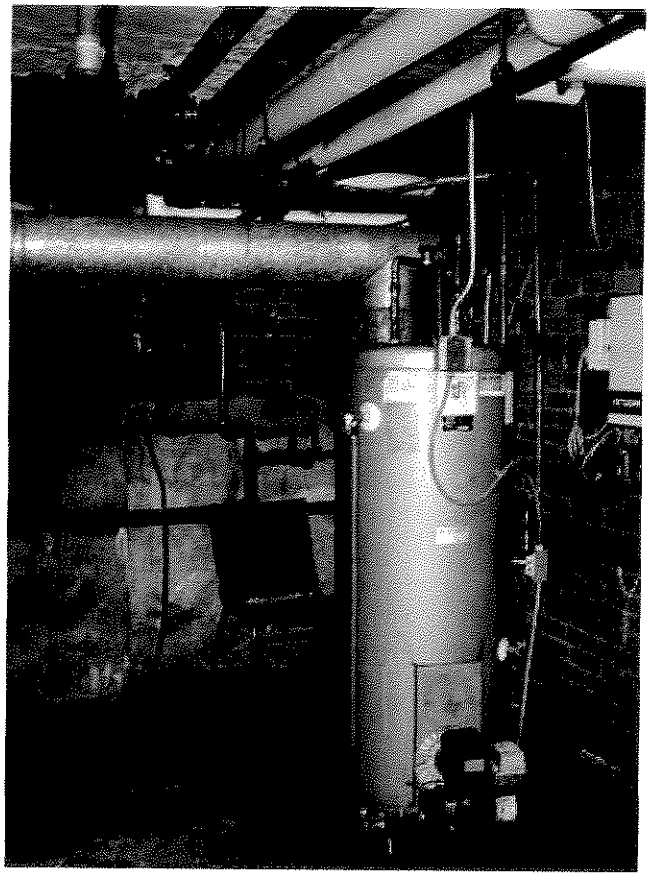


Existing Steam Boiler and Condensate Receiver / Pump Set

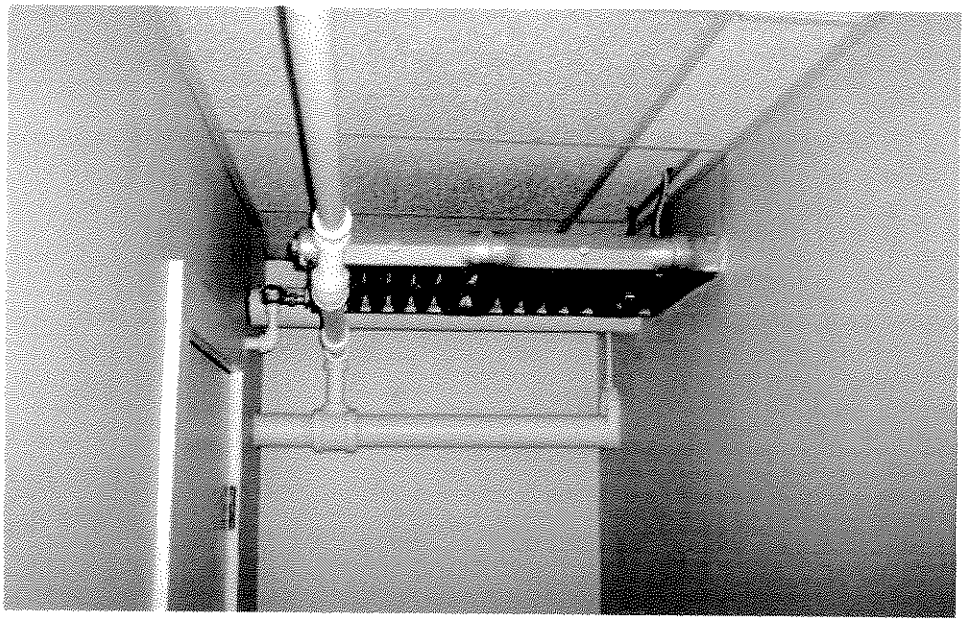


Main Steam Valves

Photos of Existing Heating Systems



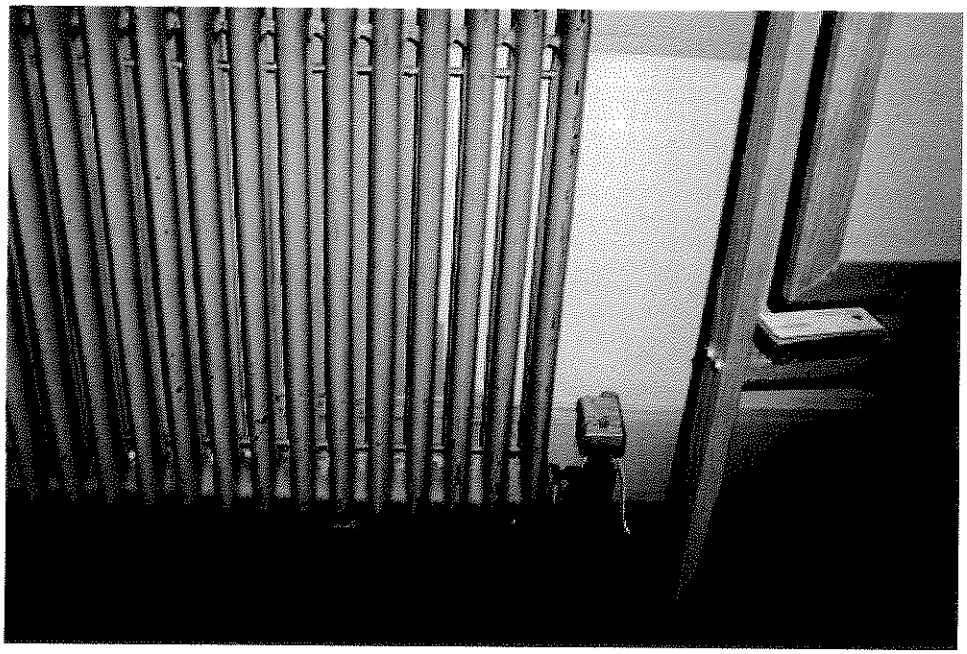
Oil-fired Domestic Water Heater



Partition around Basement Ceiling Radiator

Photos of Existing Heating Systems

Cast Iron Radiator and Steam Trap



Cast Iron Radiator and Control Valve

Existing Air Conditioning Systems

There are several thru-wall and window air conditioners throughout the building, but there is no central air conditioning of any kind. These units tend to be noisy and drafty and have limited ability to produce comfort and introduce ventilation to the spaces served. These units are generally not very efficient per se, but since they only serve small limited areas, they have fair system efficiency as they are only serving small areas.

Existing Ventilation Systems

Generally, there are operable windows throughout the building. There are no central ventilation systems throughout the building. It is unlikely that interior spaces, or any spaces during the winter, maintain proper code mandated ventilation rates.

Existing Electrical Service

We were not able to gain access to the electrical service entrance during our visits. Ernie MacVane advised that the existing service is single phase, either 400 or 600 amp. This is a serious limiting factor in the amount of work that could be done especially in regard to central ventilation systems and central air conditioning systems. Generally, three-phase service is required for motors over ½ horsepower and for air conditioning condensing units over 5 tons. Even if it were possible to utilize multiple smaller motors and condensing units, the accumulative load would exceed the capability of the existing service. Consequently, any type of major ventilation systems or central air conditioning would probably require a new electrical service to the building.

Code Considerations

As of December 1, 2010, the applicable code is the Maine Uniform Building and Energy Code (MUBEC) which includes the International Building Code (IBC) - 2009, International Existing Building Code (IEBC) - 2009, International Energy Conservation Code (IECC) - 2009, and ASHRAE 62.1 - 2007 (Ventilation), amongst others. Whereas minor equipment replacement does not necessitate compliance with current codes, major renovation work does. This must be kept in mind during any future renovation/system modifications. Mechanical ventilation systems should be considered as part of any system renovation and will be required as part of any major system renovation.

POTENTIAL HEATING SYSTEM IMPROVEMENTS

Modify Existing Steam System & Controls

Although steam systems are limited in their ability to maintain comfort conditions, some improvements are possible to the existing system. Suggested improvements would include making all heating zones controlled by the direct digital control system. Then, on a call for heat in any zone, the respective zone in the Boiler Room could be opened and the burner activated to allow steam to go to the zone calling for heat, yet preventing steam from going to any of the other zones. We estimate that this would require creating or converting about 30 heating zones in the building and the associated digital controllers in addition to some valve replacement and piping modifications.

We estimate that the ballpark budget price for this work would be about $30,000.

It should be noted that this money would be spent on an existing steam heating system that already exceeds its useful service life. When it becomes appropriate to repair or replace this heating system, some of this work would not be reusable.

Steam to Hot Water Heating Conversion

It is possible to upgrade the heating system from steam to hot water, either incrementally in phases or all as one project. Hot water heat is generally more comfortable than steam heat as it can be modulated rather than cycle on and off. Since the boiler has been replaced within the last ten years, it is possible to either convert the boiler to hot water or to add a steam to hot water converter to provide hot water heating to the zones as they are incrementally converted from steam to hot water heat. This will provide significantly better comfort conditions and potentially reduce the amount of energy required to heat the building. If an incremental approach was adopted, it would be appropriate to size the steam piping and the heating converter for the entire building load. It would then be appropriate to size the hot water heating headers off the steam converter also equal to the boiler size. The zoning could then be done incrementally as appropriate by heating zone so that only the amount of heat necessary to serve a new zone would be taken off of the converter. It would be possible to leave the rest of the

building on the steam system as currently configured. It would be recommended that cast iron radiation be replaced with new copper aluminum fin tube radiation which would be more appropriately sized for the reconfigured spaces. The hot water off the steam converter could be reset according to outside temperature, which is an effective energy saving strategy to limit the amount of heat required to meet the actual load. Should the entire building be converted to hot water, it may be appropriate to provide heating pumps that have variable frequency drives which will throttle back the motor horsepower to meet the actual heating load.

It should be noted that no central ventilation and/or air conditioning or humidification are included in this proposed option.

The estimated ballpark budget price to do this work for the whole building would be $150,000.

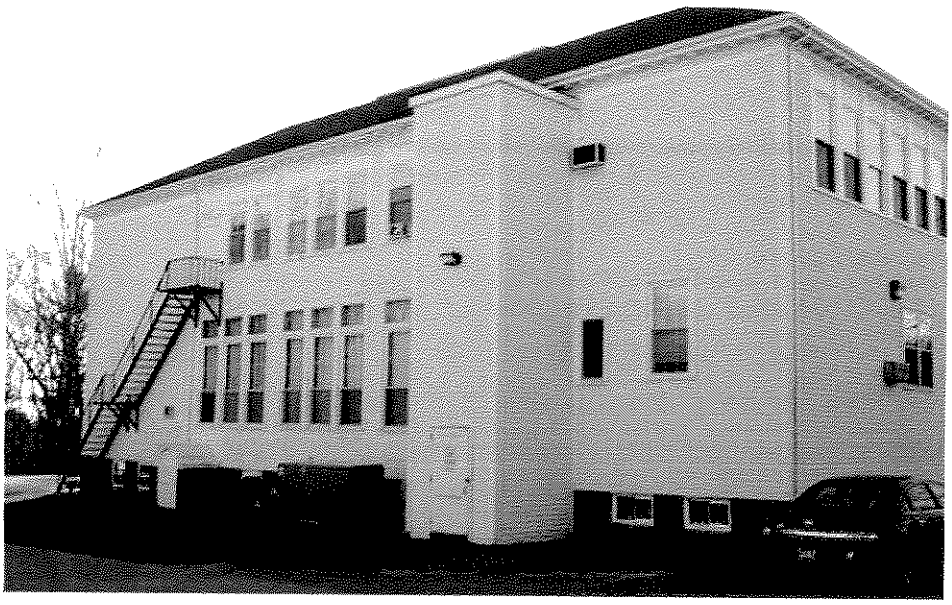
Steam to Hot Water Conversion Plus Ventilation

This item would be the same as the item above except with the addition of mechanical ventilation to the building. Depending on the type of heating system installed, there would be a number of options for installing a tempered ventilation air system. The building has attic space, flat roof above the attic, and an exterior hose tower, all of which present opportunities for introducing ventilation air in and throughout the building. It would be possible to incorporate the ventilation system into a ducted heating system for the various spaces or to provide a separate ventilation- only system which utilizes an energy recovery unit and booster coil. This option does not include central air conditioning or humidification although the potential to add either into a ducted heating/ventilating system is relatively easy.

The estimated ballpark budget price for this work would be $200,000 - $250,000.

Develop Central Heating, Ventilating & Air Condition Systems (HVAC) with a Potential for Building Humidification

The existing vertical shafts in the building are very conducive for ducts to distribute the ventilation air vertically throughout the building. It's anticipated that any project of this magnitude would involve converting the boiler from steam to hot water.



Rear of Building Showing Hose Tower and Potential Equipment Locations

Provide Packaged or Split Ducted HVAC Systems with Variable Air Volume (VAV) Reheat Coils

This type of system has been applied traditionally to office buildings of this size for several years. The ventilation air is blended with the heating and air conditioning air and distributed to the various spaces. Spaces are zoned through the use of VAV reheat boxes. The boxes vary the amount of air to each space according to the need for heating or cooling and add heat through the reheat coil to provide supplemental heating. These systems are appropriate where most of the spaces on the system are office occupancies with similar occupant densities. Council Chambers, which would have a high occupant density and conference rooms, are not appropriate to put on the same systems with offices as the mandated ventilation rates require over-ventilating offices in order to adequately ventilate conference rooms and Council Chambers. It would be possible to have multiple systems in the building serving the different types of occupancies. Heat could be provided through hot water coils in the

unit(s) and also the reheat coils. Baseboard radiation can also be provided but is expensive as it would be redundant with the ducted heating coils.

Humidification could easily be included in this option but it is not included in the estimated pricing.

Estimated ballpark budget price for converting all spaces to these type of systems would be $300,000-$350,000.

Four Pipe Fan Coil Units with Associated Chiller and Hot Water Boiler

An alternative HVAC system would be by utilizing four pipe fan coil units to provide a unitary approach to the various zones throughout the building. Each fan coil would have a separate heating and chilled water coil associated with it. Chilled water supply and return and hot water supply and return pipes would run throughout the building to all fan coil units. It would be necessary to have a packaged chiller unit outside the building to reject the heat extracted from the building for air conditioning. This unit could set out behind the building in the general area of the emergency generator. Chilled water pipe could run underground from the chiller to inside the building where it could be drained down in the winter months to prevent freeze up. The system has advantages in that the amount of refrigerant necessary is minimized to that within the packaged chiller. Efficiencies can be quite high. On the other hand, our ballpark estimate of cooling capacity is only 50 tons, which is on the low end of the size range for this type of system. Some ducted fan coil units could have directly connected ventilation air provision, although it would seem more appropriate to provide a separate energy recovery ventilator to provide ventilation air for this system.

Humidification for this type of system may be difficult unless several large units were used.

A ballpark budget estimate for the cost for this type of system is $400,000.

Variable Refrigerant Volume (VRV) System with Energy Recovery Ventilator

This VRV System is becoming increasingly popular in the United States. The system utilizes multiple indoor heat pump units of various sizes which all connect to a common refrigerant system and a common outdoor condensing unit. The advantage for retrofits is that it is possible to find an appropriately sized and configured unit for each individual zone within the building, yet only have to find appropriate locations for one or two larger condensing units

outside the building. The system is very efficient and is rated down to about 10 degrees F. There are reports that these systems have operated satisfactorily down below zero. At any rate, it is still appropriate to make sure that there is some type of supplemental/backup heat in place for this system. The existing steam heating system could be kept as backup/supplemental or some type of converted hot water system could be used. There are multiple options for the backup heat depending on the aesthetics desired and budget available. The system could be coupled with an energy recovery ventilation system to provide ventilation to the various spaces throughout the building. As the VRV System can only recover about two-thirds of the heat available, supplemental duct heating coil(s) would also be required.

Humidification would not be an easy option for this type of system.

The estimated ballpark budget price for this type of system would be between $300,000 and $450,000 depending largely on the type of backup/supplemental heating system required.

RECOMMENDED COURSE OF ACTION

Recommended course of action

Several HVAC system options have been proposed for consideration. We appreciate that budgets are often the functions of monies available as well as monies necessary, and it may be necessary to develop a phased approach over several years.

Once a preliminary scope of work and budget have been developed, it will be appropriate to obtain a licensed professional engineer to further develop the concept as well as to obtain more definitive pricing. It will eventually be necessary to obtain firm bid quotations from qualified mechanical contractors for the work.

Disclaimer: All budget cost estimates are opinions of value developed from experience and "rule of thumb" budget numbers. These estimates in no way represent a commitment to firm pricing which can only be obtained through qualified contractors' bid quotations. All budget costs should be considered relative to each other and further development of scope and concept should include further budget refinement as well.