Ashford Board of Education
Ashford, Connecticut

Regular Meeting Agenda
May 18, 2017
7:00 pm
Ashford School
District Office Conference Room

1. Call To Order
2. Persons to be Heard
   a. Comments Concerning Items on the Posted Agenda
3. Communications
4. Approval of Minutes: 05/04/2017
5. Superintendent's Report
6. Administrative Reports (Principal, Asst. Principal, Director of Pupil Personnel, Business Manager)
7. New Business
   a. Staff Resignation
8. Old Business
   a. Energy Audit
   b. FY 18 Budget Worksession
      1. Discuss Staffing for 2017-2018
9. Next Meeting Date/Agenda Items
10. Second Opportunity for Public Comment
11. Adjournment

Ashford Board of Education Goals

The Ashford Board shall:
1. Initiate policies and practices, as well as devote appropriate resources towards the improvement of Ashford students on Connecticut standardized testing.
2. Promote instructional practices rooted in the individual skills, talents, needs and performance of the student.
3. Initiate mechanisms for improved and effective communication with the community as well as town leaders and other town boards and committees.
4. Develop a three-year school improvement plan that presents, and explains, an optimal path towards educational excellence in Ashford.

All meetings, conferences, programs and activities at Ashford School are available, without discrimination, to individuals with disabilities as defined by the Rehabilitation Act of 1973 and/or Title II of the American with Disabilities Act. Individuals with disabilities requesting relocation of this meeting should call the Superintendent at 429-1927 or e-mail a request to jplongo@ashfordct.org not later than 2 working days prior to the meeting. Hearing impaired individuals may communicate their request for accommodations by using the e-mail address above, or calling the State of CT TDD relay service (800) 842-2880 or the national relay service number (800) 855-2880.

Enclosures: Minutes 05/04; Admin Reports (may be distributed at meeting); Ashford School Energy Assessment;

Ashford School

440 Westford Road (Rt. 89)
Ashford, CT 06278
School Web site: www.ashfordct.org

James P. Longo, Ed.D	**Cynthia A. Ford**	**Lisa A. Dyer**	**Troy C. Hopkins**	**Garrett J. Dukette**
Superintendent of Schools	*Director, Pupil Personnel*	*Business Manager*	*Principal*	*Assistant Principal*
860-429-1927	860-429-1927	860-429-1927	860-429-6419	860-429-6419
860-429-3651 fax	860-429-3651 fax	860-429-3651 fax	860-487-4393 fax	860-487-4393 fax
jplongo@ashfordct.org	*cford@ashfordct.org*	*ldyer@ashfordct.org*	*thopkins@ashfordct.org*	*gdukette@ashfordct.org*

May 10, 2017

RD 11 Dissolution Study Committee
Jennifer Nelson, Chair
Town of Scotland
9 Devotion Rd.
P.O. Box 288
Scotland, CT 06264

Dear Ms. Nelson;

The Ashford Board of Education wishes to thank the members of the Regional School District Dissolution Study Committee for considering Ashford School as a potential contributor to your enrollment plans as you navigate through available options.

We respectfully provide the following responses to the six questions contained in your letter:

1. Would your district be able to accommodate additional middle school aged children? If so, how many seats would you offer?
Upon review of current and projected resident student enrollment, Ashford School could take in a minimal number of students, perhaps a total of ten (10) in grades 7 and grade 8.

2. Are there any policies or procedures in place for out of district attendance? (i.e. would the student be able to complete the course of study at this location?)
The Ashford Board of Education has a policy for non-resident student attendance as is required of all boards of education. We are currently working with counsel to create policies, procedures and administrative regulations concerning non-resident tuition student attendance. We hope to have said policy in place before the start of the 2017-2018 school year.

3. What tuition rate would your district charge, and is the rate negotiable?
The tuition rate has not yet been approved by the Ashford Board of Education, however, the proposed rate is $ 10,000 per year for regular education students. The tuition rate could be negotiated with the Region #11 Board of Education.

4. How are charges for special education services calculated?
Costs associated with services provided to children with disabilities would be charged at full value directly to the Pupil Services department of the sending school district and would be in addition to the

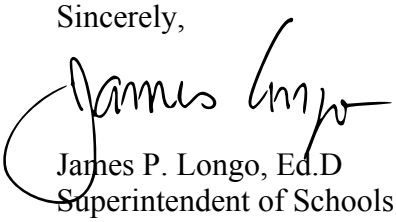
non-resident student tuition rate approved by the Ashford Board of Education.

5. Could you provide a catalog of course offerings?
We do not have a traditional course catalog; Ashford School academics are based on a fully integrated STEAM (Science, Technology, Engineering, Arts, Mathematics) curriculum. Ashford School values a core set of learning and life skills that we refer to as "Habits of Mind". These are the skills that help to prepare students for success and for solving problems in their careers and daily lives, both at home and at school. As a STEAM school we have an enhanced science curriculum that includes robotics and NASA satellite programs. In Music we have a dedicated MIDI electronic music lab and in technology we have two full computer labs and a one-to-one laptop program beginning in grade six as well as several desktops and SmartBoards in every instructional space.

6. What extracurricular and sports team opportunities does your school offer?
Ashford School participates in the QVJCC athletic conference. Our students participate in Cross Country, Track and Field, JV and varsity boys and girls soccer, basketball, baseball and softball. Ashford School has a comprehensive after school activities program that meet 4 days per week with late bus transportation provided within the town of Ashford for students in grades 3-8. After school club offerings /activities change with each trimester. Ashford School has a fully functional robotics lab, we participate in robotics competitions and we have just launched a Cubesat satellite into space. We offer many field trip and enrichment opportunities to our students.

We take great pride in our school and community and welcome you to visit. Please feel free to contact me if you have any questions or need further information.

Sincerely,



James P. Longo, Ed.D
Superintendent of Schools

Ashford Board of Education

Meeting Minutes – May 4, 2017

7:00 p.m.

District Office Conference Room

Note: Per C.G.S. §10 – 218, Board of Education meeting minutes are provided in a draft format within 48 hours of the date the meeting was held. With the exception of motions and votes recorded, these minutes are unofficial until they have been read and approved by a majority vote of the Board. Should edits be necessary, they will be made at a regularly scheduled meeting, noted in the meeting minutes, and so voted upon.

Call To Order

Chair J. Rupert called the meeting to order at 7:07 pm. Present were members M. Matthews, J. Lippert, K. Warren, J. Calarese, K. Rourke and L. Donegan (7:24 pm). Also present were Superintendent Dr. J. Longo and recording secretary J. Barsaleau. Present in the audience was AEA co-president J. Horn and resident M. Caye.

Persons to be Heard

None

a. Comments Concerning Items on the Posted Agenda

None

Communications

The board acknowledged receipt of the Spring 2017 Employment Law Newsletter from Shipman & Goodwin and the May 2017 enrollment report.

a. Regional District #11 Dissolution Study Committee Letter

Regional School District #11 sent a letter requesting information from the Ashford Board of Education as they gather data for their committee studying the possible dissolution of Regional School District #11. This will be added to the agenda under *New Business* for further discussion.

Approval of Minutes: 03/30/2017

Motion to approve the minutes of 03/30/2017 made by M. Matthews, seconded by J. Calarese and carried with two abstentions (K. Warren and J. Lippert).

Superintendent's Report

Dr. Longo reported that he had met with the director of the Odyssey Technical School and indicated they are interested in sending a team to visit Ashford School. Dr. Longo reported that he and J. Lippert attended the Board of Finance meeting on 4/27. Although the board presented some additional documentation, the board of finance is still seeking further clarification.

New Business

a. Authorization of Submission of FY 18 Individuals w/Disabilities Education Grant Application

Motion made by J. Rupert to submit the FY 18 Individuals w/Disabilities Education Grant Application. Motion seconded by K. Rourke and carried unanimously.

Motion made by J. Rupert to add as item 6b to the agenda, Discussion of and Respond to the Request of Regional District #11 Dissolution Study Committee. Motion seconded by K. Rourke and carried unanimously.

Discussion followed concerning the questions in the study committee letter including the number of middle school students that could be received by Ashford, tuition rate formulas for regular and special education and transportation. The board directs Dr. Longo to draft a response to the Region #11 study committee after reviewing middle school space availability. The letter will be reviewed by the board chair and forwarded to the study committee on or before May 15th.

Motion made by L. Donegan to add item 6c, discussion of track and field uniforms. Motion seconded by J. Lippert and carried unanimously.

The current uniforms worn by our track and cross-country teams have not held up and show obvious signs of disrepair and there are not enough complete uniforms for participants. It was noted that these are relatively new sports to Ashford. Dr. Longo is directed to follow up on this issue and order more uniforms immediately, if possible.

Old Business

a. Staff Appointment

Interviews were held recently for a second shift custodial position. The committee recommended the appointment of Michael Piantanida to the permanent position. He has been working in a substitute capacity since February.

Motion made by J. Rupert to appoint Michael Piantanida to the position of custodian, motion seconded by L. Donegan and carried unanimously.

Mr. Piantanida was introduced to the board and welcomed to the staff of Ashford School.

b. Certified Staff Tuition for Attendance of Non-Resident Student

Brief discussion was held. The item was tabled pending receipt of a draft memorandum of agreement and a board policy update. It is anticipated these items to be completed during the summer. In the meantime, Dr. Longo will write an article for the Ashford Citizen, requesting feedback and opinions on this subject matter from the public and from staff.

c. FY 18 Budget Worksession

L. Dyer sent a detailed grants spreadsheet for distribution to the Board. As mentioned earlier, a grants related document in word format will be completed and forwarded to the board of education and board of finance. It is not known if the Board of Finance has published a revised FY 18 budget calendar.

***Motion* by M. Matthews to add to the agenda as item 7d, Discussion of Energy Audit, seconded by K. Rourke and carried unanimously.**

M. Matthews inquired as to why some of the energy audit recommendations have not been put into action. The item will be added to the next meeting agenda for further discussion.

Next Meeting Date/Agenda Items

The next regular meeting date is 5/18/17. Agenda items include administrative reports, financial report, energy audit and budget.

Second Opportunity for Public Comment

A reminder that the annual Spring Concert is scheduled for May 25th.

***Motion* to adjourn the meeting (8:24 pm) made by M. Matthews, seconded by L. Donegan and carried unanimously.**

Recorded by:

Jennifer Barsaleau
Recording Secretary

Ashford School
Superintendent's Report
May 18, 2017

How Do We Plan?

We are faced with a serious dilemma. The year is ending and we don't have a budget, and we have no clear vision of what is on the horizon. The town is faced with the uncertainty of the state budget, and therefore cannot recommend a town budget. This is difficult for us, as it means our staff will likely depart for the summer recess without knowing what is planned for next year. We all work hard to ensure that morale is high and everyone is feeling our commitment to excellence. This is increasingly difficult when there are so many rumors and such fear regarding what the state might do to the local municipalities. Our teachers, parents and all of our staff are concerned and unsettled. We must all do our part to support the feeling among all of our staff that Ashford School will not be abandoned during this situation.

Tuition based enrollment

I have responded to inquiries by Region 11 regarding the possibility of our school accepting students from their district through a tuition agreement. Upon review with the administrative team, it appears that we do not have room for many out of district students. To accept any significant number of students would require additional staff and a radical change in schedules to accommodate additional classes.

Tech Space Renovation

The unfinished rooms formally housing the shop classes has been an area of the school that is sorely needed and yet renovation funds have not been available. We have therefore decided to begin renovations one aspect of the project each year using our general fund budget until funds are available to finish the work. We are exploring getting doors and windows put in this June.

Staffing and Grade Configuration for 2017-2018

We have been discussing class size and how many classes we can support for each grade in anticipation of the pending budget process. There are several possibilities depending upon the amount of money approved for our budget next year. We have a parent community that supports small class size, and a commitment to the concept of an environment that allows for individual attention. The current state budget crisis, and the impact that it might have on local school districts may threaten both our small class sizes and our ability to operate a school that reflects our community standards. I don't think this possibility has been publicly discussed and the solutions that may result from budget cuts may come as a surprise to our parents in our community.

End-of-the-Year Considerations

It is hard to believe, but the end of the school year is upon us. I have asked the administrative team to begin June by reminding the staff that we have to prepare for the summer break by updating our individual websites, making notes for our incoming students at every grade level, and identifying areas of curriculum and instruction that might be improved by summer work.

Summer BOE Retreat

Agenda considerations:

- Reports by Administrative Team Members
- Board Goals for 2017-2018
- Areas you wish to see improved
- Other ideas: Please let me know

Ashford School
BOE Principal's Report – Troy C. Hopkins
May 18, 2017

Ashford School Goals

- Promote creativity, student choice, and critical thinking through the implementation of interdisciplinary curriculum, following the concept of STEAM (Science, Technology, Engineering, Art, Mathematics), which applies to the real world now and in the future.
- Improve informative and positive communication throughout the Ashford community to assist in student success in all areas.
- Develop and implement programs and practices to improve all students' academic and social skills.

Vision Statement for Ashford School

Empowered Learners Striving for Positive Change

We will work on the wording of a mission statement that will outline steps to achieve the vision.

Teachers in Space

Carly Imhoff, Kate Craven, and ***Dory Manfre*** recently participated in a Teachers in Space adventure including launching a weather balloon in New York and several activities in Nevada.

- Prepared cubes with experiments
- Inventory, packing list for sending to Argentina, and editing the runbook
- Learning about aviation
- In the air on a glider and an experimental plane
- Interviews with a pilot and an airport manager

Check out their experiences at: http://ashfordadventures.weebly.com/

Educator Space Academy

Kate Craven and ***Carly Imhoff*** will attend the Educator Space Camp at the US Space and Rocket Center in Huntsville, Alabama this summer. "Experience the authenticity of simulated space missions so you can teach with authority and inspiration!" (Space Camp) http://www.spacecamp.com/space/educators

Student Recognitions

Emerson Dyer, 5th grade student, and ***Nora Brown***, 6th grade student, received honorable mentions in the 29th issue of *Connecticut Student Writers* (*CSW*) magazine. You can read their pieces on our website.
Emerson's is titled "Bad Flashback" and ***Nora's*** is titled "Monster".

"To be selected from this group of talented writers is a credit to you, your family, and your teachers."
(Connecticut Writing Project)

Staff Awards and Recognitions

Jason Argonaut

Carly Imhoff was awarded an opportunity to participate in a "bio-blitz" in Malaysia. She will work with a team to identify the level of biodiversity in order to qualify the area as a United Nations Educational, Scientific and Cultural Organization (UNESCO) protected site.

National Education Association (NEA) Global Learning Fellowship

Carly Imhoff was awarded a fellowship to South Africa to learn about their school system and share information about education in the United States. She will travel to Washington D.C. for training over a long weekend in October 2017, and then spend 10 days in South Africa during the summer of 2018.

Mari Haas Prize for Excellence in FLES Teaching!

Rebecca Aubrey was awarded $1,000 from Foreign Language in the Elementary Schools (FLES) to support her travel to Puerto Rico, where she will develop a series of interdisciplinary lessons for elementary school students including culture and history. Quote from FLES: "Thank you for your dedication to FLES teaching, to your young students, and to the professional community! We look forward to seeing you and celebrating with you on Saturday, May 20!"

Ashford School
BOE Assistant Principal's Report – Garrett J. Dukette
May 18, 2017

Writing

- Writing PD for the 2016-2017 school year:
  - Teacher's College (5 teachers between last summer and this summer)
  - Administrative support PD for Writing Pathways
  - In-house PD on:
    - Mini-lessons
    - Using the writing rubrics
    - Vertical articulation
    - Cohort scoring of benchmarks
- Significant improvement in writing instruction K-8 will ensure that every year will reflect writing growth, as students move through the writing program in more consistent fashion.

Curriculum and Instruction

- Social Studies vertical articulation has occurred grades 5-8. K-5 will occur before the school year ends.
- Smarter Balanced testing, CMTs, and Next Gen Science testing will all be finished as of next Friday, May 26.
  - In a sign of a reduction in emphasis on testing, the state has rescinded the law that every teacher must has a SMART goal based on standardized tests.
- Summer curriculum work will focus on:
  - Vertical alignment of and whole-school philosophy for reading instruction, and will be looking at research to answer some of the following questions:
    - Should students be all reading the same book or have choice?
    - What is the value in direct grammar instruction
    - How is vocabulary instruction best approached?
  - 7th and 8th grade Student Success Planning
    - How do we give students more ownership?
    - Can we develop an 8th grade Capstone?
    - Community Service as a requirement?
  - Continued support for the increasing 1 to 1 initiative

Student Motivation and Behavior

- Significant reduction in suspensions from 2015-16 to 2016-17.
- Student feedback was used to provide information to teachers to improve the use of the PBIS system
- PBIS grant team will be working with Ashford School in June to "audit" our program and provide us with feedback for growth

Gifted and Talented

- Using staff feedback, STRIVE identification will occur in September
- Staff feedback on the "mentor" program will be occurring over the final five weeks of the year.

Communication

- At this point, we have called home for 60+ Pawsitive office referrals

Climate

- Career fair on May 5- 17 presenters, students in K-8 attended.
- Community service day on April 29- 12 students from Ashford worked with 8 students from Eastern at various community locations around town.

Director of Pupil Personnel Service Report

May 18, 2017

Submitted By: Cynthia Ford

End of the year wrap up:

- Evaluations for both teachers and paraprofessionals are in progress. End of the year meetings will begin to occur.
- Letters for our ESY program are going out next week and we will be hiring individuals to cover our students attending the program.
- Next year planning has begun:
    - Continuing consultation with a Clinical Psychologist to ensure we are providing the support needed for our identified students along with our at-risk population. This works as a great support to not only the programing in the building but also acts as the bridge between home and school to ensure that the child is getting the assistance needed.
    - Continuing the consultation services with a speech pathologist to assist with early intervention services in our Prek-3 students.
- Scientific Research Based Intervention (SRBI) will continue with the Student Intervention Team (SIT). SIT is a team of teachers, administrators and support faculty getting together to review areas of concern (all academic social and behavioral needs) and document strategies and specific goals to ensure progress in these areas. This team meets every 4-6 weeks to discuss progress. This assisted with ensuring students are receiving the appropriate academic and social supports needed to progress alongside their peers.

Ashford, CT

Ashford School Energy Assessment

ICF International

A walk through Energy Audit was performed on December 1, 2016 as part of the Eversource Clean Communities Municipal Technical Assistance Program. The audit identified multiple energy conservation measures to reduce electric and fuel oil consumption.

1. Upgrade Indoor Linear Fluorescent Lighting and Fixtures to 4' 18W LED's.
2. Steam Trap Maintenance
3. Reduce Air Infiltration through the Building Envelope
4. Consider Replacing Steam Boilers with Fully Modulating Hot Water Boilers
5. Steam Outdoor Reset
6. Check for Proper Operation of Steam Air Valves
7. Boiler Feed Water Treatment
8. Replace motors less than 1 HP with ECM
9. Tie Bathroom Exhaust Fans with Occupancy Controls
10. Install .5 GPM Aerators on Lavatory Sinks
11. Replace Electric Resistance Water Heater with Heat Pump Water Heater

12. Control Domestic Hot Water Recirculation Pumps with a Timer or Aquastat

13. Investigate Actual Hot Water Usage

14. Insulate Copper Boiler Loop Piping and Domestic Hot Water Piping

15. Control Motors with a Variable Speed Drive or Soft Start

16. Outdoor Condenser Head Pressure Control with ECM Motor.

17. Replace Stove with Electronic Ignition Instead of Standing Pilot

18. Tie Air Handlers and RTU's to CO2 Based Ventilation in the Gymnasium, Cafeteria and Any Other Area Brining in Outside Air

19. PC Power Management Computer

20. Proper Time Scheduling and DDC Expansion with Space Sensors

21. Employee Energy Education Program

22. Replace Window Air Conditioners With Heat Pump Mini Ductless Splits.

23. Complete Installation of Direct Digital Controls System.

Estimated Energy Savings, Payback Period and Costs for Recommended Measures				
Energy Conservation Measures	***kWh or kBTU Savings***	***Approximate Yearly Savings in Dollars***	***Cost Estimates***	***Simple Payback in Years***
Convert 32W T8's to New LED Fixtures (Approximately 1191 lamps)	36,500	$5,800.00	$23,500.00	4.1
Convert 10 HP Pumps to VFD (total of 2)	39,000	$6,200.00	$7,000.00	1.1
Convert 1 HP Pumps to VFD (total of 4)	7,800	$1,250.00	$1,400.00	1.1
Yok RTU indoor motor (1 HP Each x 2 units)	1,700	$270.00	$700.00	2.6
Gym and Cafeteria AHU's (Estimated at 7.5 HP Fan Motor x 3)	18,000	$2,800.00	$7,875.00	2.7
Convert Timer Operated Exhaust Fans to VFD (8 Total estimated at 1 HP Each)	16,500	$2,650.00	$2,800.00	1.1
Savings, $ Savings, Total Cost and ROI	**119,500**	**$18,970.00**	**$43,275.00**	**2.3**

Ashford School, Ashford, CT

Ashford School was constructed in the 1951 and has had additions in 1958, 1967, 1975 and 1994. The building is currently used as a school. The building is heated with four (4) fuel oil boilers, two steam and two hot water. Portions of the facility are air conditioned. Due to the time of the audit, personnel familiar with the operation of the facility where on hand for only a short portion of the energy audit.

HVAC System Findings:

There are two boilers in the upper mechanical room. These boilers are HB Smith Mills 44 boilers and were installed in approximately 1960. These boilers produce steam that is converted to hot water in a steam to hot water heat exchanger. There are two (2) boilers in the lower mechanical room, these boilers are 1894 series and produce hot water to a different section of the building then the HB Smith. Hot water is delivered to radiators and hydronic coils in AHU's and RTU's. Observed gaps in heating water piping.

There are four AHU's and two RTU's currently serving this building. RTU 1 and 2 provide air conditioning and heating to library, computer lab and reading room. AHU 1 provides heat only to the cafeteria and AHU 2 and 3 provide heat only to the gym. AHU- 4 provides heat for the upper level music room. Most of these AHU's and RTU's provide fresh air for ventilation.

HVAC components are controlled by a hybrid pneumatic and DDC system.

Lighting Equipment Findings:

- A majority of the lights in this facility are 32W T8, observed few 25W T8's.
- Majority of lights are switch controlled.
- Exterior lighting has been converted to LED.

Other Equipment:

- 50 Gallon Electric Water Heater and 300 Gallon Indirect Water Heater for Kitchen.
- PC's in offices and classrooms. It was unknown if there is central control for these PC's.

Building Envelope:

- The building envelope could be improved.

Energy Conservation Measure Recommendations

Recommendation 1: Upgrade Indoor Linear Fluorescent Lighting and Fixtures to 4' 18W LED's.

Currently, Ashford School operates mostly 32W T8 lights. It appears outdoor lights are controlled by a timer. All observed lights inside the facility are switch operated but a few are motion sensor operated. For maximum efficiency it is recommended indoor lights have a complete fixture replacement and use 18W LED's. Many new fixtures have controls capabilities such as motion sensors and photocells. Dimmable LED's should be used when ample light is available through window or skylights. The motion sensors would allow lights to come on when the space is actually occupied and shut off if not occupied. The incorporated photocell would read light levels (lumens) for the space and would dim or brighten based on actual light levels allowing optimal lighting levels and allow for daylight harvesting strategies.

Estimated Energy Savings, Payback Period and Costs for Lighting				
Energy Conservation Measures	***kWh or kBTU Savings***	***Approximate Yearly Savings in Dollars***	***Cost Estimates***	***Simple Payback in Years***
Convert 32W T8's to New LED Fixtures (Approximately 1191 lamps)	36,500	$5,800.00	$23,500.00	4.1
Estimated Total Yearly kWh Savings, $ Savings, Total Cost and ROI	**36,500**	**$5,800.00**	**$23,500.00**	**4.1**

These retrofit measures could be applied to any of the T8 fixtures throughout the building. To achieve maximum savings an independent lighting designer should be consulted to find area's to de-lamp and maximize control strategies. It is suggested that trial areas be set up to assess the different alternatives. The use of ENERGY STAR or Design Lights Consortium (DLC) listed LED fixtures is recommended to ensure quality components.

Recommendation # 2: Steam Trap Maintenance

Heat is provided to the building through a steam boiler and delivered through cast iron radiators and fin tube radiators. Steam traps allow condensate formed in the heating process to be drained from the equipment. When steam traps fail, they often fail in the open position, resulting in live steam being discharged from the system. This can waste large amounts of energy. Steam trap failures are often not detectable without regular maintenance checks. It is good practice to keep up regular maintenance, because steam leaks can be very costly. Savings from steam trap maintenance will depend on the number of leaks found. Each steam leak can waste approximately 7 therms per day. (This will vary based on the size of the leak and the pressure in the lines, but this is a reasonable approximation for the facility.) Assuming that 3 faulty steam traps go unnoticed for a period of 3 months, the extra energy cost to the building is $1,500-$2000 per year in energy costs. Work with in-house or external maintenance personnel to check steam traps.

Recommendation # 3: Reduce Air Infiltration through the Building Envelope.

Outside air can penetrate a building through the windows, doors, walls, and roof. A leaky building envelope can result in an increase in building heating and cooling loads, and potentially electrical loads if occupants use space heaters or fans. The escape of conditioned air forces the HVAC systems to work longer and harder to provide the required space temperature. In addition, drafts created by improperly sealed windows and doors can cause significant occupant discomfort and decreased productivity of employees. Problems in this facility were observed with the windows, doors and ceiling and wall insulation. To reduce infiltration, it is important to tighten the existing building by locating all air leaks in the windows, doors and exterior walls. They should be sealed with the appropriate materials and techniques such as weather-stripping on doors, sealing and caulking on windows, and proper insulation distribution on walls, ceilings and roofing. If occupants have any control of window and door operation, they should be educated to understand proper operation of the windows and doors. Costs and savings associated with these recommendations are difficult to quantify.

Recommendation # 4: Consider replacing steam boilers with fully modulating hot water boilers.

According to a study by Taitem Engineering, as well as multiple other studies, it is apparent that steam heating systems suffer from high energy usage, relative to other heating systems. Additionally, steam heating systems use substantially more water than buildings that do not have steam heating systems. Likewise, multiple studies have further confirmed the magnitude of

these losses, by showing that converting steam heating systems to hot water systems consistently saves significant fuel energy use, with savings ranging from 13% to 49%. It is generally recognized that these energy and water losses are high because steam heating systems have so many different types of losses: steam leaks, steam trap failures, pipe losses due to high temperature differential, combustion losses, and overheating buildings (heating imbalance). This measure, if designed correctly, can save large amounts of energy especially in shoulder months.

Recommendation # 5: Steam Outdoor Reset.
While onsite I didn't observe a reset for the steam system. There are control strategies that can be used as a Steam Outdoor Air Reset and Heat Timer® has a good explanation of how this would operate. "The MPC Platinum control Series is designed to operate a steam boiler or a steam valve to provide steam outdoor reset. Utilizing the steam cycle concept and the outdoor temperature, the control varies the duration of the steam supply to the building in a cycle based on the outdoor temperature. Each of these options has a set of preconfigured, but adjustable settings to meet the specific needs of each building. The MPC Platinum will reduce fuel costs while maintaining a more comfortable space temperature."

Recommendation # 6: Check for Proper Operation of Steam Air Valves.
A common energy problem with steam systems comes from clogged and undersized air vents. Uneven heating is usually caused by parts of the system being air-locked. And the solution is to replace the existing vents, or add new large-volume air vents to the main supply pipes. Replacing malfunctioning or undersized air vents can make a significant difference. New thermostatic air vents are a good choice for oversized radiators (a common situation) since they control the flow of steam into the radiators, thus avoiding overheating problems and improving energy efficiency.

Recommendation # 7: Boiler Feed Water Treatment.
Non-treated boiler feed water can lead to scaling issues as well as issues with dissolved solids that come out as part of the process of making steam. Well water can have as high as 1,250 ppm of dissolved solids. 1,000,000 pounds of this water will have 1,250 pounds of solids. A 100 hp boiler vaporizing 3,450 pounds of this as make-up water could leave 4.3 pounds of solids behind.

Recommendation # 8: Replace motors less than 1 HP with ECM Motors ECM motors allow for variable speeds which can correspond to the unit's call for air flow. Typically, an ECM motor will slowly come on and increase the speed of the fan gradually as opposed to just coming completely on at startup. Work with a mechanical contractor to obtain more detailed cost and savings calculations.

Recommendation # 9: Tie Bathroom Exhaust Fans with Occupancy Controls.
Many times bathrooms are unoccupied but the exhaust fan is still running. This could be accomplished by interlocking operation of these fans with occupancy controls. This would substantially reduce the amount of outside air that is brought in to the building that then needs to be conditioned. Further investigation is necessary to determine actual cost and savings associated with this measure. The success of the measure will depend somewhat upon the configuration of the ventilation system.

Recommendation # 10: Install .5 GPM Aerators on Lavatory Sinks.
During the audit it was observed that some bathrooms use 2.0 GPM aerators on the sinks. Replacing the existing aerator with ones that use .5 GPM will reduce overall water consumption at sinks by 75% and reduce hot water consumption at sinks by 75%. This is an inexpensive measure with quick return on investment. Have maintenance staff install the new aerators.

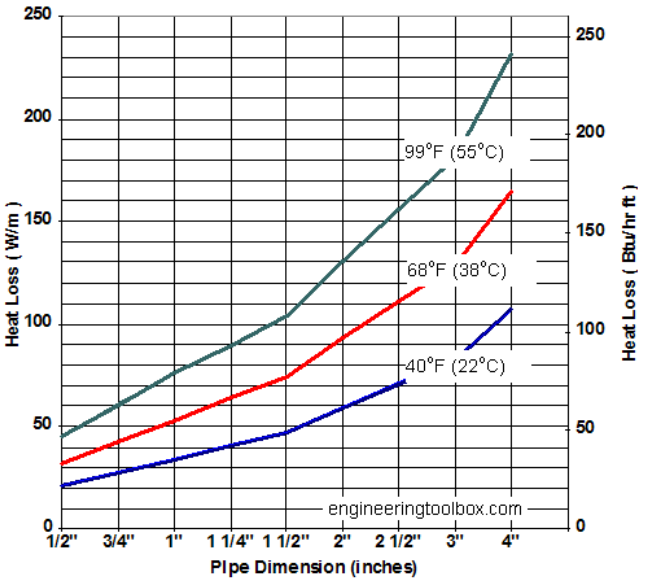
Recommendation # 11: Replace Electric Resistance Water Heater with Heat Pump Water Heater.
Currently there is a 50 gallon electric hot water heater in one of the mechanical rooms. These water heaters are inefficient and expensive to operate. Consider replacing the electric water heater with a heat pump water heater. Energy Factors for many electric water heaters are 1.0 while heat pump water heaters exceed 3.24, some models have even higher SEER ratings. Work with a plumbing or mechanical contractor for more detailed cost and energy savings.

Recommendation # 12: Control Domestic Hot Water Recirculation Pumps with a Timer or Aquastat.
Boiler room uses pumps to circulate domestic hot water. The hot water is distributed throughout this facility by a recirculating system. Recirculating systems are used in large buildings to keep the water in the lines warm, so that occupants don't have to wait for hot water. In some buildings, recirculating pumps run 24 hours per day. Energy can be saved by controlling the

operation of recirculating pumps with a return line aquastat, which can turn off the pumps as long as the hot water return temperature remains above the set point. Alternatively, a timer can be used to turn off the pumps overnight. Both control strategies will reduce heat losses and pump energy. Controlling hot water recirculating pumps can typically save 5-10% of the energy required for domestic hot water heating in a facility. Work with a mechanical contractor to install controls.

Recommendation # 13: Investigate Actual Hot Water Usage.
In the mechanical room there is a 300 gallon indirect domestic hot water tanks. Oversized domestic hot water systems are inefficient because they store more hot water then is actually needed. If at all possibly install a water flow meter into the inlet of the domestic hot water tanks a monitor the usage possibly trend it in the controls system. If it is found that the hot water system is oversized work with a mechanical contractor and/or mechanical engineer

Recommendation # 14: Insulate Copper Boiler Loop Piping and Domestic Hot Water Piping
Observed all copper boiler loop and DHW piping with no insulation. This allows large amounts of heat to be lost through pipes. It is ***HIGHLY*** recommended that all boiler loop pipe be insulated. Also observed the electric water heater pipe not insulated. Both water in and out should be insulated from tank to at least 3' from tank. Also an insulation jacket for the electric water heater should be installed. Below is a chart from Engineering Toolbox that shows BTU loss per foot for different sizes of copper pipe.



Recommendation # 15: Control Motors with a Variable Speed Drive or Soft Start.

Estimated Energy Savings, Payback Period and Costs for VFD's				
Energy Conservation Measures	***kWh or kBTU Savings***	***Approximate Yearly Savings in Dollars***	***Cost Estimates***	***Simple Payback in Years***
Convert 10 HP Pumps to VFD (total of 2)	39,000	$6,200.00	$7,000.00	1.1
Convert 1 HP Pumps to VFD (total of 4)	7,800	$1,250.00	$1,400.00	1.1
Yok RTU indoor motor (1 HP Each x 2 units)	1,700	$270.00	$700.00	2.6
Gym and Cafeteria AHU's (Estimated at 7.5 HP Fan Motor x 3)	18,000	$2,800.00	$7,875.00	2.7
Convert Timer Operated Exhaust Fans to VFD (8 Total estimated at 1 HP Each)	16,500	$2,650.00	$2,800.00	1.1
Estimated Total Yearly kWh Savings, $ Savings, Total Cost and ROI	**83,000**	**$13,170.00**	**$19,775.00**	**1.5**

Energy consumption can be decreased by installing a variable speed drive on motors for the pumps in hot water systems and fans in AHU's and RTU's. When accelerating an AC motor to full speed using a full voltage connection, a large inrush current may be required. Currently the boiler hot water pumps have standard motors and motor starters. It is recommended that the motors of these units be replaced with high efficient motors with VFD motor starters. If motors were upgraded to high efficient motors with VFD starters substantial energy savings could be achieved. Work with a mechanical contractor to obtain more detailed cost and savings calculations.

Recommendation # 16: Outdoor Condenser Head Pressure Control with ECM Motor.

An electronic head pressure controller will modulate the condenser fan motor speed to vary the airflow through the outdoor condenser resulting in lower energy consumption. Typically the control will monitor the head pressure by sensing the sub-cooled liquid line temperature and will vary the fan speed based on the load to maintain optimal operating conditions. This will reduce the energy consumption for air conditioning applications. Studies have shown that head pressure controls coupled with ECM motors improves the efficiency not only of the fan but of the compressor as well. Consult the manufacturer for proper installation requirements and work with

a mechanical or controls contractor to install ECM motors and head pressure controller. Energy savings for this measure are difficult to quantify.

Recommendation 17: Replace Stove with Electronic Ignition Instead of Standing Pilot.
Standing pilot stoves many times operate the exhaust fan above the stove to ventilate combustion gases from pilot. Also as much as 75% of the fuel consumption can be consumed by the standing pilots. Because of this replacing the standing pilot stove with an electronic ignition stove is recommended.

Recommendation # 18: Tie air handlers and RTU's to CO2 based ventilation in the gymnasium, cafeteria and any other area brining in outside air. The auditorium is designed to have ventilation for approximately 500 people but during the audit we observed 12 music students in the auditorium. This variation between design and actual occupancy offers a good application for demand controlled ventilation. The space currently receives the same amount of fresh air regardless of the occupancy, which results in higher than necessary space conditioning loads on the building during the low occupancy periods. With demand controlled ventilation, a carbon dioxide sensor can be used to measure the fresh air necessary for the space, rather than providing the amount necessary under maximum occupancy. Further investigation is necessary to determine the cost and savings associated with this measure. The success of the measure will depend somewhat upon the configuration of the ventilation system.

Recommendation # 19: PC Power Management for Computers.
Energy use can be controlled through a combination of automatic power management features and manual shut down by users. Organizations can use a standardized setting so that all monitors go into sleep mode after 10 minutes of inactivity. Power management can also be enabled for computer hard drives, but may require some investigation and testing before full implementation. In addition, employees should be educated on proper procedures for shutting down computers and monitors each night. There are no costs to implement the power management, other than internal labor. Additional information is available on the ENERGY STAR website at www.energystar.gov/powermanagement .

Recommendation # 20: Proper Time Scheduling and DDC Expansion with Space Sensors
The goal of weekday night setback and an even more aggressive weekend set back is to flat line your equipment so nothing operates or operates very minimally. Tremendous savings could

be achieved with proper time scheduling. If areas are used after hours only those rooms should be kept at the normal daytime operating temperature and doors for that space should be closed while used after hours. Below is a guide of how the schedule should look. If the building warmup/cooldown times aren't long enough before the building is occupied to make temperature the schedule can be adjusted. Make 30 minute incremental changes until the right building warm up/cool down times have been achieved. For this measure to be implemented existing pneumatic thermostats need to be replaced with an expansion of the DDC system to include space sensors. Work with a mechanical/controls contractor to look at expanding existing DDC.

Winter Operation							
Time of Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
12:00 AM	55°F	60°F	60°F	60°F	60°F	55°F	55°F
1:00 AM	55°F	60°F	60°F	60°F	60°F	55°F	55°F
2:00 AM	55°F	60°F	60°F	60°F	60°F	55°F	55°F
3:00 AM	55°F	60°F	60°F	60°F	60°F	55°F	55°F
4:00 AM	55°F	60°F	60°F	60°F	60°F	55°F	55°F
5:00 AM	55°F	60°F	60°F	60°F	60°F	55°F	55°F
6:00 AM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
7:00 AM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
8:00 AM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
9:00 AM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
10:00 AM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
11:00 AM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
12:00 PM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
1:00 PM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
2:00 PM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
3:00 PM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
4:00 PM	70°F	70°F	70°F	70°F	70°F	55°F	55°F
5:00 PM	60°F	60°F	60°F	60°F	55°F	55°F	55°F
6:00 PM	60°F	60°F	60°F	60°F	55°F	55°F	55°F
7:00 PM	60°F	60°F	60°F	60°F	55°F	55°F	55°F
8:00 PM	60°F	60°F	60°F	60°F	55°F	55°F	55°F
9:00 PM	60°F	60°F	60°F	60°F	55°F	55°F	55°F
10:00 PM	60°F	60°F	60°F	60°F	55°F	55°F	55°F
11:00 PM	60°F	60°F	60°F	60°F	55°F	55°F	55°F
Summer Operation							
Time of Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
12:00 AM	80°F	75°F	75°F	75°F	75°F	80°F	80°F
1:00 AM	80°F	75°F	75°F	75°F	75°F	80°F	80°F
2:00 AM	80°F	75°F	75°F	75°F	75°F	80°F	80°F
3:00 AM	80°F	70°F	75°F	75°F	75°F	80°F	80°F
4:00 AM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
5:00 AM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
6:00 AM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
7:00 AM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
8:00 AM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
9:00 AM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
10:00 AM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
11:00 AM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
12:00 PM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
1:00 PM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
2:00 PM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
3:00 PM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
4:00 PM	70°F	70°F	70°F	70°F	70°F	80°F	80°F
5:00 PM	75°F	75°F	75°F	75°F	80°F	80°F	80°F
6:00 PM	75°F	75°F	75°F	75°F	80°F	80°F	80°F
7:00 PM	75°F	75°F	75°F	75°F	80°F	80°F	80°F
8:00 PM	75°F	75°F	75°F	75°F	80°F	80°F	80°F
9:00 PM	75°F	75°F	75°F	75°F	80°F	80°F	80°F
10:00 PM	75°F	75°F	75°F	75°F	80°F	80°F	80°F
11:00 PM	75°F	75°F	75°F	75°F	80°F	80°F	80°F

Recommendation # 21: Employee Energy Education Program.

An employee energy education program can raise awareness among employees about how energy is used in the building, and provide recommendations on how employees can help save energy and reduce costs. Energy-saving tips can include proper operation of thermostats, personal computers, light switches, copy machines and printers. Savings estimates for energy education programs are difficult to quantify and vary widely. Savings were conservatively estimated at 1% of current consumption and cost. Costs will vary based on the level of sophistication of the program. An energy education program can be developed by internal employees or with help from external organizations. The ENERGY STAR website has resources that can help with energy education efforts.

Recommendation # 22: Replace Window Air Conditioners With Heat Pump Mini Ductless Splits.

Observed window style air conditioners in several rooms. A minisplit system could save substantial costs associated with cooling these rooms. Air conditioners are rated by EER and minisplits are rated by SEER. Window style air conditioners have EER's in the neighborhood of 9 while minisplits have SEER ratings exceeding 22. Consult with a mechanical contractor to get more detailed cost and savings estimates.

Recommendation # 23: Complete Installation of Direct Digital Controls System.

Direct digital controls can provide greater accuracy of control than pneumatic systems, and DDC systems can provide opportunities to expand to new control strategies that will increase energy savings for the facility. Further investigation is necessary to determine the cost and savings of a new DDC system.

Eversource offers increased incentives if two or more types of energy conservation measures (ECM's) are completed at the same time. Please contact your Eversource Engineer to discuss how you may combine energy conservation measures to optimize the incentive you receive from Eversource. Their contact information is below. It is best to reach out to them by email first, since they are often visiting communities.

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Please contact me with any questions or comments.

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Figure 1: Steam boilers and hot water boiler nameplate information

Figure 2: Gym Air Handler

Figure 3: Single Pane Window

Figure 4: Marginal HP Pump Motor

Figure 5: Media Center RTU

Figure 6: Exhaust hoods on roof

Figure 7: 300 gallon hot water storage tank

Figure 8: Pneumatic air compressor