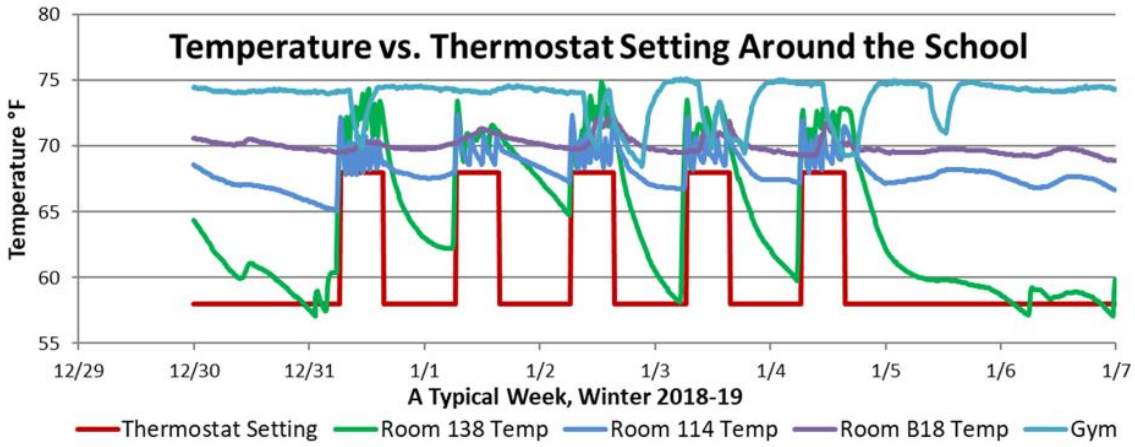
Heating Plant Status
June 18, 2019

Summary by Paul Torcellini

Background:
The current heating plant at Eastford Elementary is comprised of two major portions. The hot water system provides water at 180ºF to the 1991 wing of the building which includes rooms 101 to 108. The steam system supplies the remainder of the building. The radiators in the steam section are original to the 1949 and 1963 wings and have not been replaced. The exception is room 107 probably was replaced in 1991 as part of the original office conversion in this space.

Condition:
A condensate return line failed under the concrete floor in B24. This supplied the hallway north of B28. The supply water from well #1 runs through this hallway. The pipe repair is expensive due to the tilework and concrete repair. In addition, having a pipe with standing water is not best practice and it has appears that it has been repaired in the past. This same pipe configuration also is under the boiler room door (same condensate line—with the addition of the bathrooms above).

The windows in the building were replaced and the system is substantially oversized for the actual loads. Because of the size of the radiators and the nature of the steam systems, the valves rarely open. All the values were either replaced or verified that they worked properly in the summer of 2017. As the valves only open a small amount, the orifice wear is high cause controllability issues in the zones. The boy's room (111) as well as the radiator in the adjoining hallways are no longer controllable. An example of the temperatures compared to the thermostat settings are shown below. Note that this data is available for all the zones.



The boilers for the building are oversized for the current conditions. On the coldest days of the year they run less than 70% of the time and this for morning warmup, which puts an artificially high load on the system. The pressure in the steam system has been reduced as low as possible and the nozzle has been reduced to the smallest possible size for the number of boiler sections. The hot water boiler nozzle has also been downsized. The hot water boiler does not show any setback from weekends to weekdays as the controller for the gym has no setback.

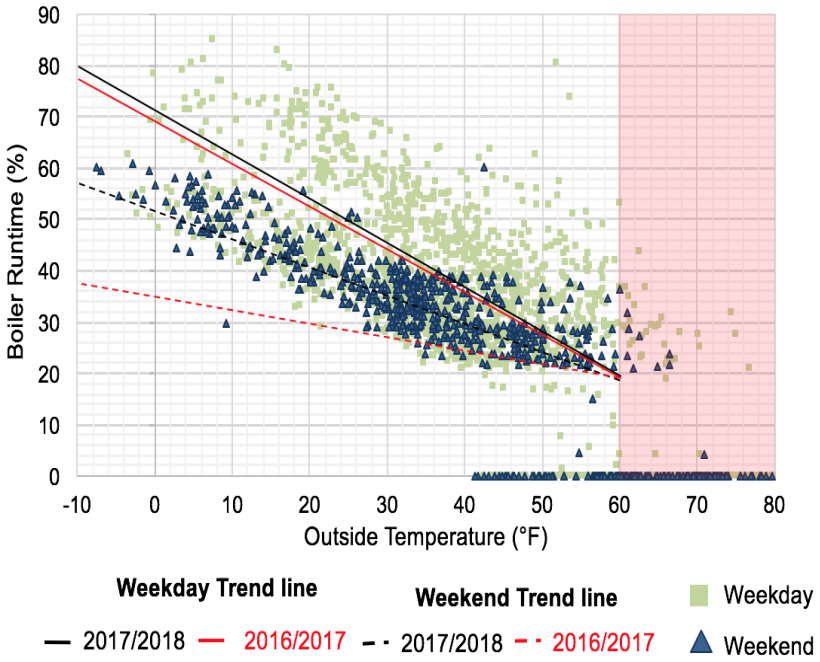


Figure 2: Boiler runtime compared to outside temperature for the steam boiler between October 2017 – January 2018 along with weekday boiler runtime trend line (solid) and weekend boiler runtime trend line (dashed) for 2016-2017 (red) and 2017-2018 (black).

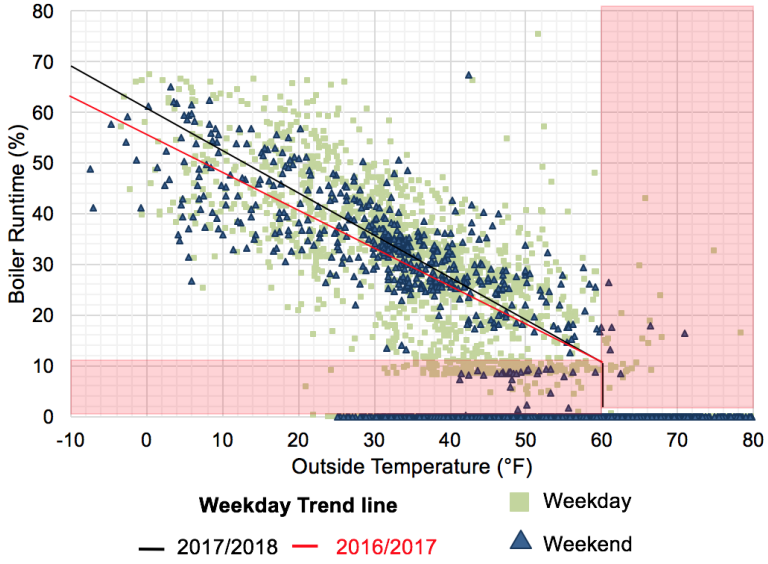
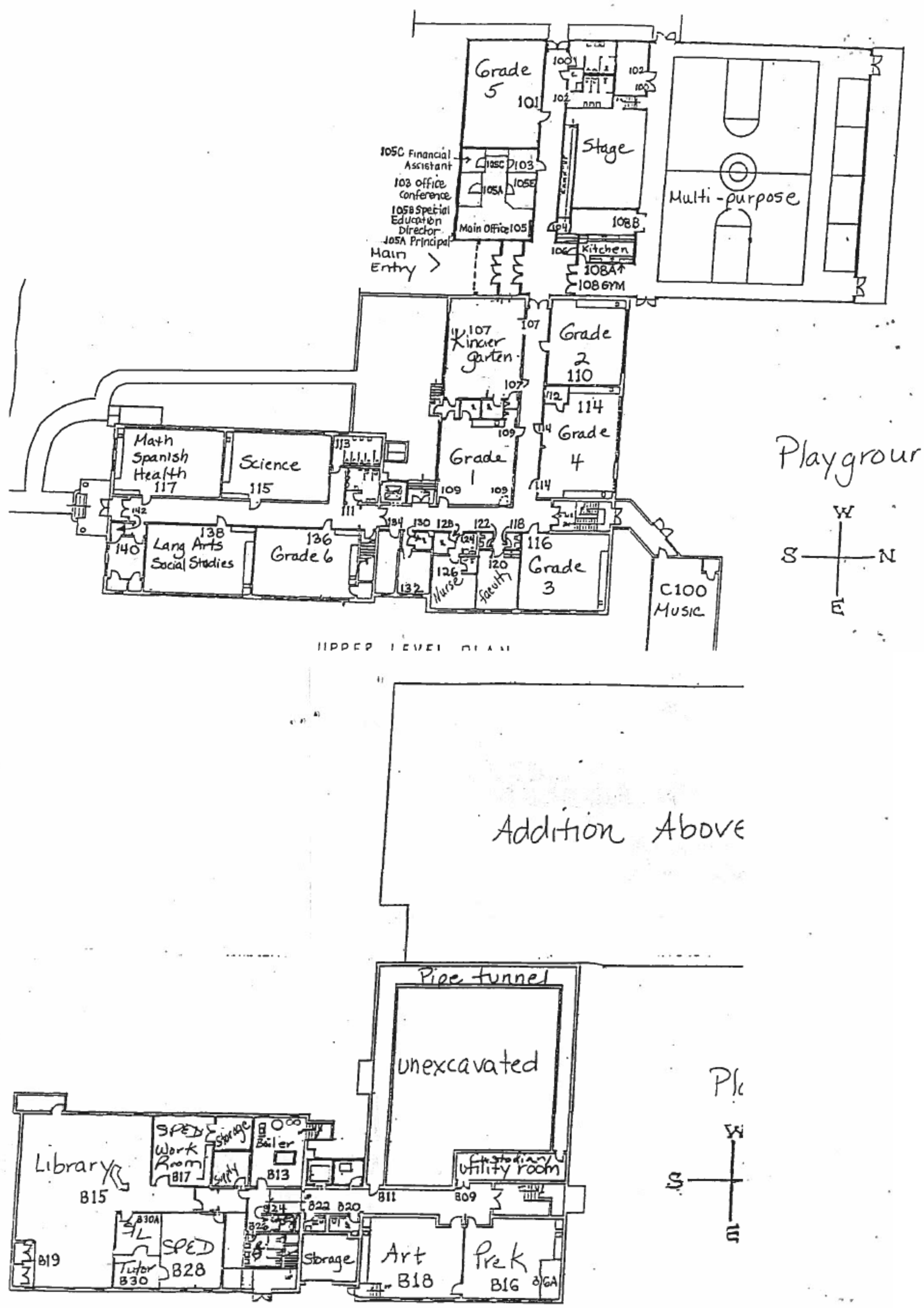


Figure 3: Boiler runtime compared to outside temperature for the hot water boiler between October 2017 – January 2018 along with weekday boiler runtime trend line 2016-2017 (red) and 2017-2018 (black).


Grade 5
101
105C Financial Assistant
103 Office Conference
105B Special Education Director
105A Principal
Main Office 105
Main Entry
Stage
Multi-purpose
108B
Kitchen
108A
108 GYM
107 Kindergarten
Grade 2
110
114
Grade 4
Grade 1
109
Math Spanish Health
117
Science
115
113
111
142
140
Lang Arts Social Studies
138
136
Grade 6
134
130
128
124
122
118
126 Nurse
120 Faculty
116
Grade 3
132
C100 Music
Playgrour
W
S
N
E
UPPER LEVEL PLAN
Addition Above
Pipe tunnel
unexcavated
Custodian
utility room
Library
B15
B19
SPED Work Room
B17
Storage
Boiler
B13
B11
B09
B30A
SPED
B28
Tutor
B30
B22
B20
B24
Storage
Art
B18
Pre K
B16
B16A

Proposed Solution from EMCOR:

Install an equal flow hot water return starting under Room 110 and running under Room 114. Reconnect at Room 111 entrance. The flows will be balanced between the two returns with balancing valves. Install isolation valves and a Taco 007 pump for each of B16, B18, failed radiator north of B28, 116, 120, and 126 with new fin tube properly sized for each zone based on the 140ºF return temperature. Connect to existing programmable thermostats. If possible include 111 and 113 to remove entire problem condensate line.