

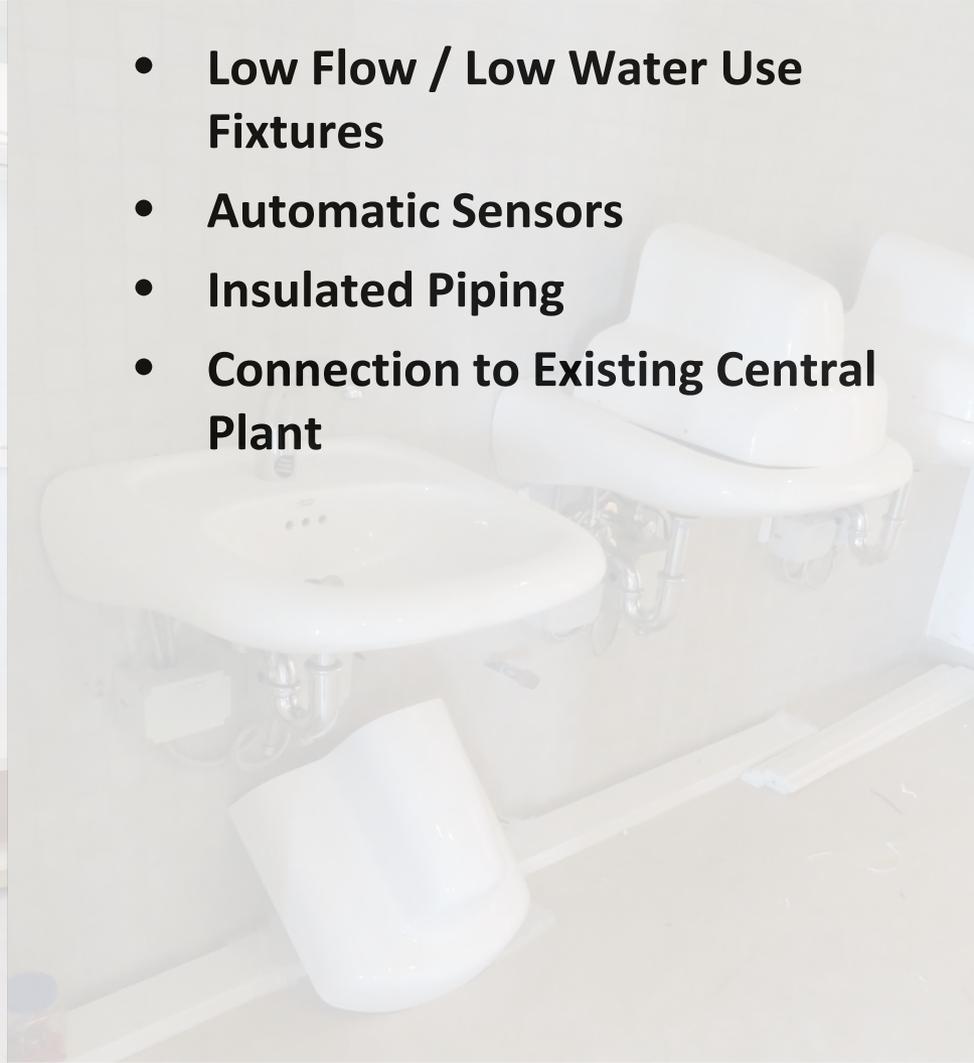
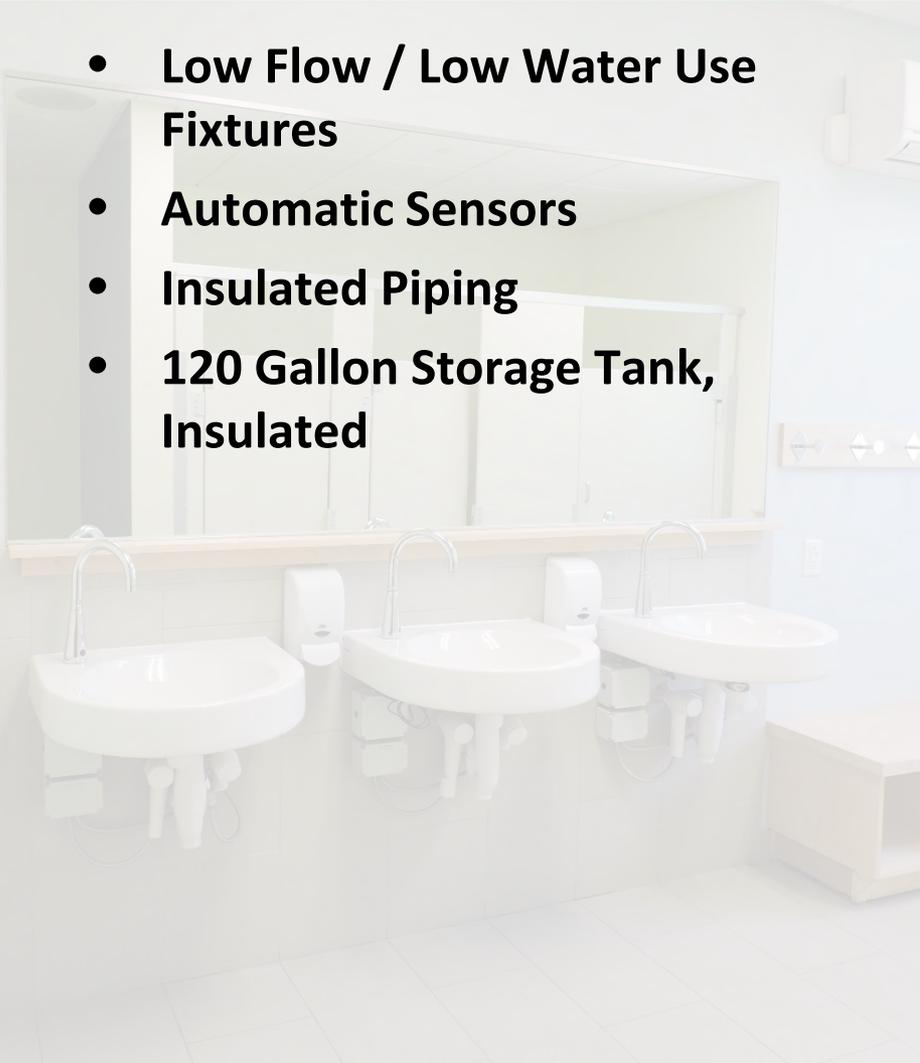
PLUMBING

MAINE COAST WALDORF HIGH SCHOOL

- **Low Flow / Low Water Use Fixtures**
- **Automatic Sensors**
- **Insulated Piping**
- **120 Gallon Storage Tank, Insulated**

WAYNFLETE LOWER SCHOOL

- **Low Flow / Low Water Use Fixtures**
- **Automatic Sensors**
- **Insulated Piping**
- **Connection to Existing Central Plant**



RENEWABLES

MAINE COAST WALDORF HIGH SCHOOL

- **Designed to be Net Zero**
- **110 Q-Cell Solar Panels
300W each**
- **33 kW system**
- **Projected Use = 34,000± kW/yr**
- **Building Use = 3 houses, 5x less
than a high school of same size**
- **Power Purchase Agreement
with vendor**

WAYNFLETE LOWER SCHOOL

- **Future Installation of PV array
planned in future phase
(campus wide master plan)**
- **Projections showed that PVs
located on other buildings and
off-site locations would be most
effective in offsetting overall
campus energy load**

RENEWABLES

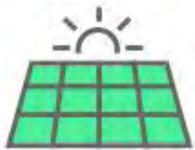
MAINE COAST WALDORF HIGH SCHOOL

Overview

Energy today	Energy this month	Lifetime energy	Lifetime revenue
29.63 kWh	386.09 kWh	47.63 MWh	\$6,772.89



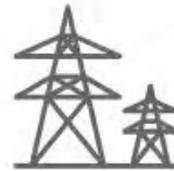
0.85 kW



7.63 kW



6.78 kW



Site Details



Site Status



ID

552374

Name

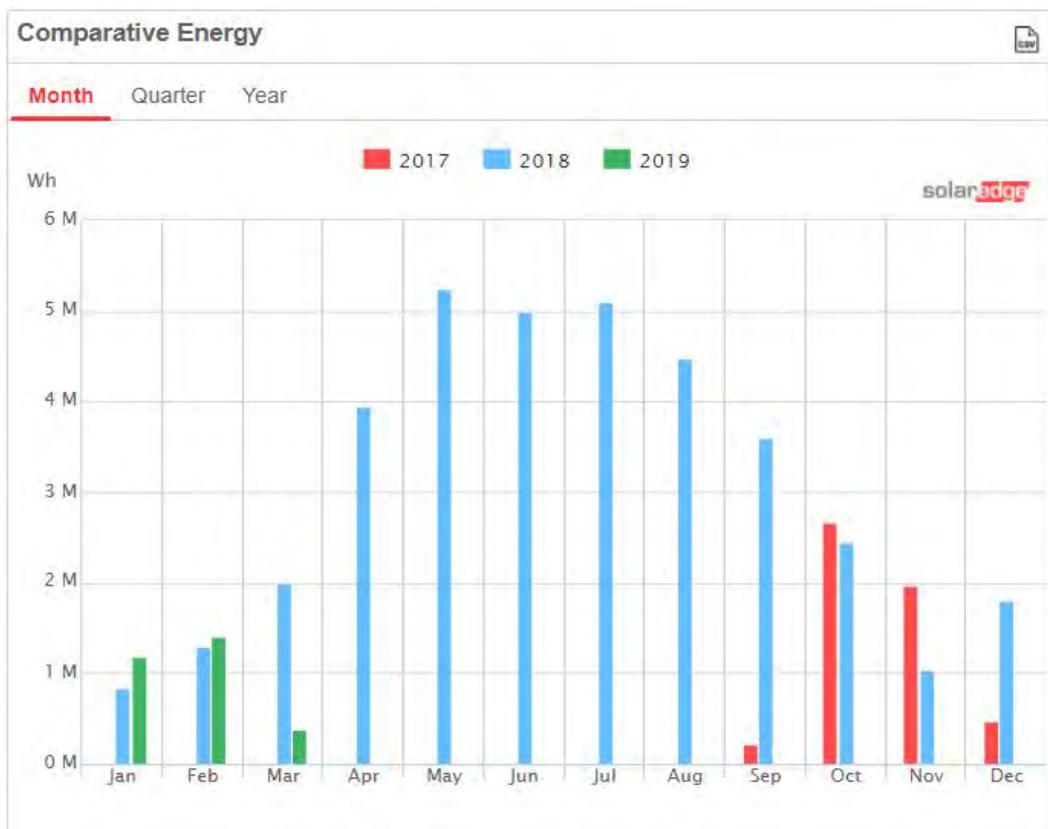
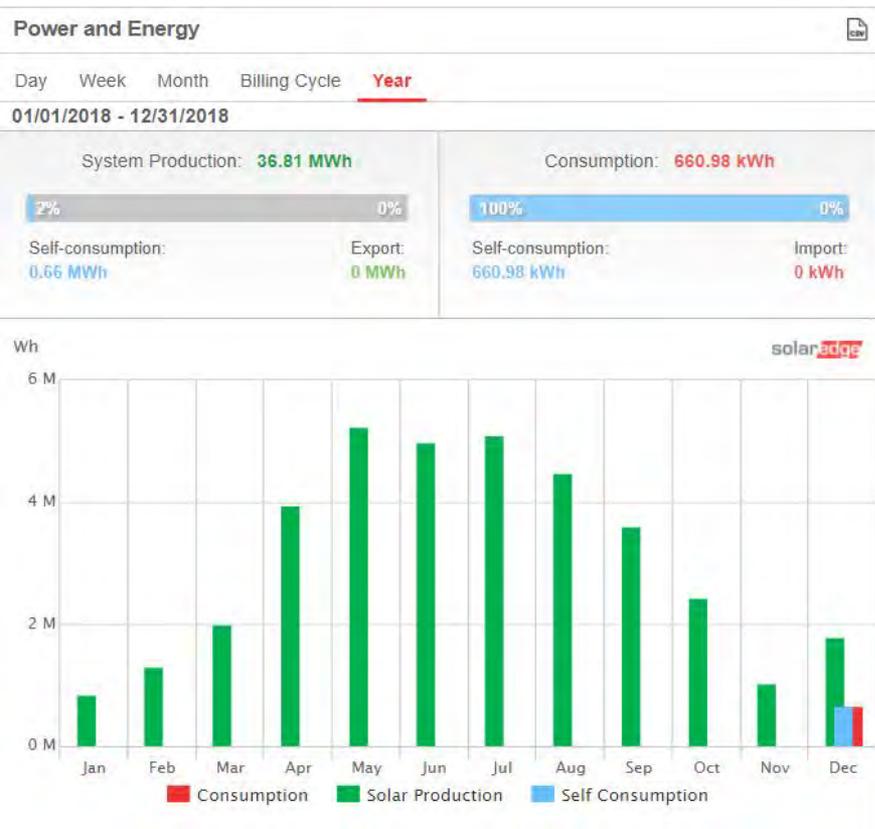
Maine Coast Waldorf High Sc...

Address

Deer Road 57

RENEWABLES

MAINE COAST WALDORF HIGH SCHOOL



RENEWABLES

MAINE COAST WALDORF HIGH SCHOOL



[Home](#) Welcome Samuel Zuckerman



Choose a site (insert at least 3 letters to search):

Maine Coast Waldorf High School

Show playback | Total | Physical layout



359.88 kWh	355.77 kWh	353.62 kWh	360.62 kWh	352.32 kWh	351.17 kWh	335.78 kWh	331.74 kWh	334.37 kWh	337.11 kWh	326.38 kWh	337.86 kWh
2.1.1	2.1.2	2.1.3	2.1.4	2.1.5	2.1.6	2.1.7	2.1.8	2.1.9	2.1.10	2.1.11	2.1.12
330.95 kWh	328.86 kWh	322.17 kWh	325.43 kWh	326.98 kWh	324.69 kWh	327.6 kWh	330.82 kWh	326.99 kWh	327.63 kWh	357.34 kWh	348.65 kWh
1.1.10	1.1.9	1.1.8	1.1.7	1.1.6	1.1.5	1.1.4	1.1.3	1.1.2	1.1.1	2.1.14	2.1.13
323.92 kWh	322.65 kWh	331.01 kWh	319.38 kWh	322.34 kWh	324.66 kWh	332.86 kWh	326.21 kWh	332.62 kWh	332.9 kWh	334.45 kWh	327.97 kWh
1.1.11	1.1.12	1.1.13	1.1.14	1.1.15	1.1.16	1.2.1	1.2.2	1.2.3	1.2.4	1.2.5	1.2.6
328.6 kWh	324.7 kWh	324 kWh	323.68 kWh	325.08 kWh	321.48 kWh	327 kWh	328.25 kWh	328.73 kWh	331.02 kWh	331.11 kWh	335.12 kWh
1.3.3	1.3.2	1.3.1	1.2.15	1.2.14	1.2.13	1.2.12	1.2.11	1.2.10	1.2.9	1.2.8	1.2.7
340.01 kWh	330.27 kWh	328.74 kWh	326.4 kWh	329.42 kWh	326.94 kWh	332.75 kWh	332.86 kWh	331.06 kWh	333.86 kWh	333.62 kWh	340.37 kWh
1.3.4	1.3.5	1.3.6	1.3.7	1.3.8	1.3.9	1.3.10	1.3.11	1.3.12	1.3.13	1.3.14	1.3.15

331.33 kWh	335.68 kWh	323.68 kWh	328.61 kWh	327.35 kWh	333.43 kWh	333.93 kWh	347.46 kWh	340.95 kWh	344.83 kWh
3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.1.6	3.1.7	3.1.8	3.1.9	3.1.10
336.73 kWh	330.29 kWh	329.24 kWh	329.04 kWh	331.72 kWh	334.52 kWh	338.08 kWh	344.63 kWh	348.08 kWh	350.23 kWh
3.2.4	3.2.3	3.2.2	3.2.1	3.1.16	3.1.15	3.1.14	3.1.13	3.1.12	3.1.11
328.83 kWh	327.13 kWh	325.56 kWh	332.36 kWh	333.82 kWh	333.68 kWh	336.82 kWh	340.41 kWh	337 kWh	343.78 kWh
3.2.5	3.2.6	3.2.7	3.2.8	3.2.9	3.2.10	3.2.11	3.2.12	3.2.13	3.2.14
333.03 kWh	326.12 kWh	329.7 kWh	335.02 kWh	334.91 kWh	332.53 kWh	335.94 kWh	332.41 kWh	335.34 kWh	338.04 kWh
3.3.7	3.3.6	3.3.5	3.3.4	3.3.3	3.3.2	3.3.1	3.2.17	3.2.16	3.2.15
335.07 kWh	335.99 kWh	338.2 kWh	337.63 kWh	338.77 kWh	337.76 kWh	329.71 kWh	335.51 kWh	336.45 kWh	340.46 kWh
3.3.8	3.3.9	3.3.10	3.3.11	3.3.12	3.3.13	3.3.14	3.3.15	3.3.16	3.3.17

RENEWABLES

MAINE COAST WALDORF HIGH SCHOOL

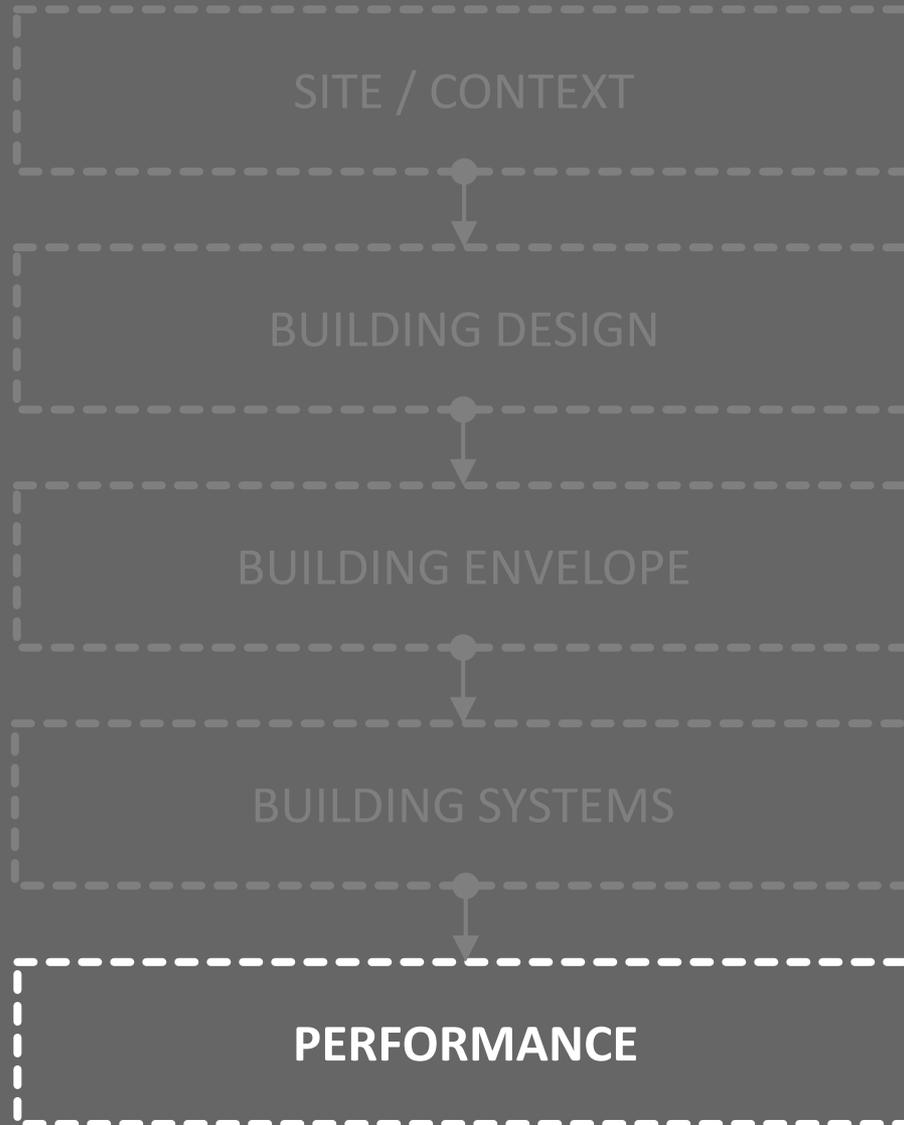


RENEWABLES

MAINE COAST WALDORF HIGH SCHOOL



DESIGN CONSIDERATIONS



PERFORMANCE



ESTIMATING LOADS



VERIFICATION

ESTIMATING LOADS

MAINE COAST WALDORF HIGH SCHOOL

WAYNFLETE LOWER SCHOOL

Heating demand

specific: 5.48 kBtu/ft²yr
 target: 6.4 kBtu/ft²yr
 total: 55,977.07 kBtu/yr



Cooling demand

sensible: 0.75 kBtu/ft²yr
 latent: 0.03 kBtu/ft²yr
 specific: 0.78 kBtu/ft²yr
 target: 1.4 kBtu/ft²yr
 total: 7,942.54 kBtu/yr



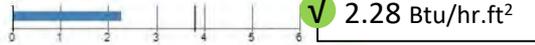
Heating load

specific: 4.42 Btu/hr ft²
 target: 4.7 Btu/hr ft²
 total: 45,152.73 Btu/hr



Cooling load

specific: 2.28 Btu/hr ft²
 target: 3.8 Btu/hr ft²
 total: 23,282.09 Btu/hr



Source energy

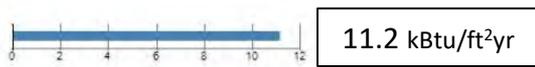
PHIUS+ Source Zero: NO

total: 103,494.57 kWh/yr
 specific: 34.57 kBtu/ft²yr
 target: 38.04 kBtu/ft²yr
 total: 353,103.28 kBtu/yr
 specific: 34.57 kBtu/ft²yr



Site energy

total: 114,388.19 kBtu/yr
 specific: 11.2 kBtu/ft²yr
 total: 33,527.18 kWh/yr
 specific: 3.28 kWh/ft²



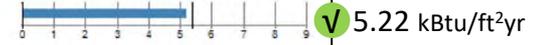
Air tightness

ACH50: 0.39 1/hr
 CFM50 per envelope area: 0.03 cfm/ft²
 target: 0.58 1/hr
 target CFM50: 0.05 cfm/ft²



Heating demand

specific: 5.22 kBtu/ft²yr
 target: 5.38 kBtu/ft²yr
 total: 125,482.85 kBtu/yr



Cooling demand

sensible: 1.31 kBtu/ft²yr
 latent: 0.05 kBtu/ft²yr
 specific: 1.36 kBtu/ft²yr
 target: 1.82 kBtu/ft²yr
 total: 32,615.22 kBtu/yr



Heating load

specific: 4.04 Btu/hr ft²
 target: 4.7 Btu/hr ft²
 total: 97,236.62 Btu/hr



Cooling load

specific: 2.55 Btu/hr ft²
 target: 3.8 Btu/hr ft²
 total: 61,353.75 Btu/hr



Source energy

PHIUS+ Source Zero: NO

total: 259,801.28 kWh/yr
 specific: 36.85 kBtu/ft²yr
 target: 38.04 kBtu/ft²yr
 total: 886,391.28 kBtu/yr
 specific: 36.85 kBtu/ft²yr



Site energy

total: 297,841.63 kBtu/yr
 specific: 12.38 kBtu/ft²yr
 total: 87,297.38 kWh/yr
 specific: 3.63 kWh/ft²



Air tightness

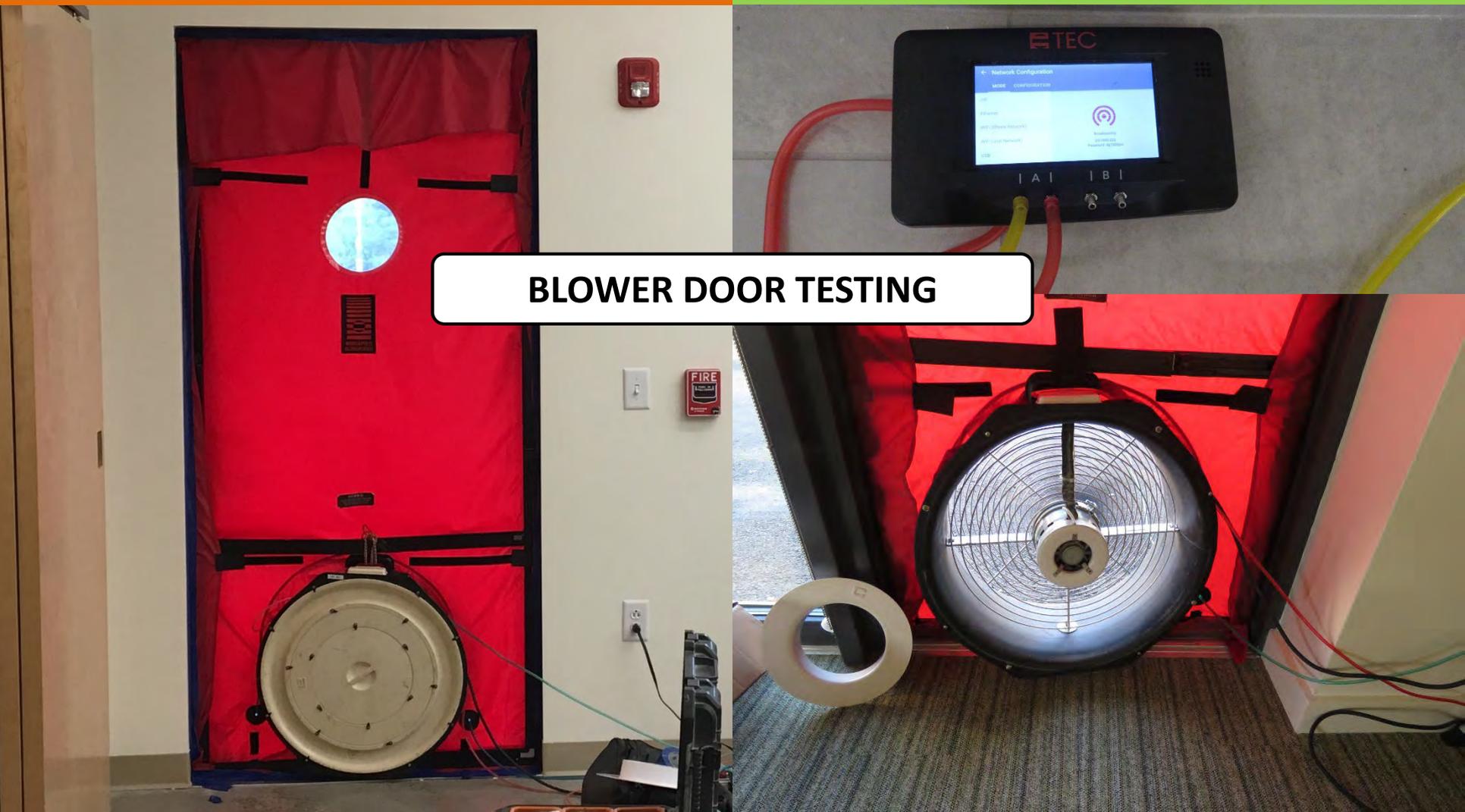
ACH50: 0.38 1/hr
 CFM50 per envelope area: 0.05 cfm/ft²
 target: 0.38 1/hr
 target CFM50: 0.05 cfm/ft²



VERIFICATION

MAINE COAST WALDORF HIGH SCHOOL

WAYNFLETE LOWER SCHOOL



BLOWER DOOR TESTING

VERIFICATION

MAINE COAST WALDORF HIGH SCHOOL

FIRST TEST RESULTS:

Average CFM50=0.040

Average ACH50=0.47

FINAL TEST RESULTS:

Average CFM50=0.035

Average ACH50=0.40

WAYNFLETE LOWER SCHOOL

FIRST TEST RESULTS:

Average CFM50=0.096

Average ACH50=0.56

NEXT TEST RESULTS:

Average CFM50=0.105

Average ACH50=0.71

AND THEN IT GOT COLDER. . .

LESSONS LEARNED

LESSONS LEARNED

MAINE COAST WALDORF HIGH SCHOOL

- © Doors & ADA hardware
- © Management time & cost of certifications
- © Managing moisture in the Flat Roof
- © Multiple Wall Systems Adds Complexity and Cost
- © Location of ERV / managing noise



LESSONS LEARNED

WAYNFLETE LOWER SCHOOL

DESIGN

Doors + ADA Hardware

Incentive Programs → Consider Administrative Time

VE / BID / SUBMITTALS

Product Substitutions + Data Formats

CONSTRUCTION

Mid-Construction Blower Door Testing

Increase Commissioning Scope + Involvement

Expansion Joints at Existing Buildings

YOU JUST GOT **SCHOOLED!**

QUESTIONS + DISCUSSION

