

WESTWOOD ELEMENTARY SCHOOLS BUILDING PROJECT COMMITTEE
Westwood, Massachusetts

SUSTAINABILITY SUBCOMMITTEE MEETING MINUTES

August 18, 2020

Attendance and Call to Order

The meeting, held remotely¹, was called to order 8:02am by Chair Maya Plotkin. Also present on the videoconference were: Ken Aries, Brian Bayer, John Cummings, Nancy Hyde, Lemma Jn-baptiste, and Anthony Mullin. Ex-officio members Julie Gervais and Tom Philbin were also present. John Cianciarulo recorded the minutes.

Mrs. Plotkin recognized the live stream of the meeting which was provided for real-time, public access to the activities of the Sustainability Subcommittee. Members of the public were able to view a live stream of the meeting via the Internet at www.westwood.k12.ma.us/live.

Discussion Items

Mrs. Plotkin recognized Rob Fitzgerald of Dore and Whittier. Mr. Fitzgerald then introduced guests invited to the meeting: Jonathan Patch, Geotechnical Engineer at McPhail Associates, overseeing the geothermal test well; Matt DiSalvo, Mechanical Engineer at GGD (Garcia, Galuska & DeSousa); and Erik Ruoff from The Green Engineer.

Heating and Cooling Systems Options and Life Cycle Costs

Decision Points Overview

1. Priority: 20% above new energy code to achieve 2% points from MSBA
2. Heating and cooling system options:
 - a. Baseline: Natural gas
 - b. Tier-1: Water source heat pump with supplemental electric boiler
 - c. Tier-2: Ground source heat pump (Geothermal)
 - d. Tier-3: Ground source heat pump (Geothermal): with supplemental electric boiler, less wells
3. 100% air conditioning vs. partial air conditioning and dehumidification ventilation
4. Rainwater cistern irrigation

Mr. Fitzgerald introduced Mr. Patch, who provided an overview on the geothermal test well.

Geothermal Test Well Update

- Test Well Program and Geologic Conditions
 - Test well completed with no issues, faster than expected (600-feet in one day)
 - Vibration levels measured were low
 - Granite encountered ten feet below grade
 - Water yield approximately 5-10 gallons per minute
- Implications for Design
 - Rock has higher conductivity than soil; granite is, therefore, good
 - Once thermo-conductivity test is completed next week, the well will be covered
 - Approximately seventy wells are anticipated 25-feet apart
 - Three to four months for drilling (with two drill rigs)

¹ Remote meeting held in accordance with Executive Order of Massachusetts Governor, March 12, 2020

- Can be done at the beginning, during, or end of construction (non-critical path item)

Mrs. Plotkin asked for confirmation on the ground source heat pump and whether there would be fewer wells. Mr. DiSalvo stated that there would be sixty rather than seventy in the Tier-3 option. Ten fewer wells would reduce the time by three weeks.

Mr. Bayer asked for confirmation that granite would not be a problem. The team responded that this is correct. It is solid; when drilling it stays open and does not collapse. From 10 to 600-feet down is all granite.

Mr. Philbin cautioned that there is the potential of radon intrusion in the building with granite that shallow.

Mrs. Gervais asked about the noise level for neighbors during the three to four month period. Mr. Patch responded that it would be a noise level of a typical construction site.

Mr. Cummings asked for confirmation that there would be no hammering or explosives. Mr. Patch responded that that is correct, there will be no blasting of bedrock. The vibration level would be 0.2 inches per second. The typical number to cause damage to buildings is 2.0 inches per second. Therefore, it is quite low.

Tim Bonfatti, Executive at Compass Project Management, asked about the impact in configurations if a different technology was chosen. Is this a generic test well, or if another approach is decided upon, would another type of test be necessary? Mr. Patch responded that there are multiple types of geothermal wells. If there is a switch to a different type, another well may be necessary.

Lifecycle Cost Analysis Summary

A summary of the analysis was presented. Some highlights include:

- Code Baseline (Natural Gas)
 - EUI: 32.1
- Base Design (Natural Gas)
 - EUI: 29.2
 - Annual maintenance cost: \$130,279
 - 20-year exterior equipment replacement cost: \$919,850
 - Combined expense savings: \$11,313
 - Total life-cycle savings: \$1,856,606
- Tier-1
 - EUI: 26.8
 - Total life-cycle savings: (\$685,229)
- Tier-2
 - EUI: 20.1
 - Annual maintenance cost: \$121,079
 - 20-year exterior equipment replacement cost: \$0
 - Combined expense savings: \$9,144
 - Total life-cycle savings: (\$2,307,572)
- Tier-3
 - EUI: 22.8
 - Total life-cycle cost savings: (\$2,396,360)

Other Considerations

- The use of full air conditioning will adjust the total numbers proportionately: The 20% above energy code will still be achieved

- EUI impact of using 100% air conditioning vs. partial air conditioning is negligible: Thornton Tomasetti estimates 0.35 to 0.50 EUI increase and \$1,625 to \$2,000 annual cost
- Tier-1 (Water source heat pump): Biggest concern is noise impact and additional cost to mitigate

Tier 1 vs. Tier 2 – Heating and Cooling Systems

Tier 1: Municipal Water Source Heat Pump System

Pros:

- Aligns with Westwood Resiliency and Sustainability Comprehensive Draft Plan
- Lower upfront cost

Cons:

- Less energy efficient than Tier-2 system, resulting in:
 - May require increased electrical service capacity
 - More solar energy required for Net-Zero Energy (NZE)
 - Increased generator size required
- Need supplemental electric boiler due to heat rejection
- More mechanical equipment visible exterior than Tier-2
- Higher HVAC sound levels at building exterior vs. Tier-2
- More maintenance; moving parts, vs. Tier-2

Tier-2: Geothermal Source Heat Pump System

Pros:

- Aligns with Westwood Resiliency and Sustainability Comprehensive Draft Plan
- More energy efficient than Tier-1 system, resulting in:
 - Likely decrease in electrical service capacity vs. Tier-1
 - Less solar energy required for NZE
 - Smaller generator size required
- Less mechanical equipment visible and building exterior
- Lower HVAC sound levels at building exterior vs. Tier-1
- Less annual maintenance: Fewer moving parts vs. Tier-1

Cons:

- Higher upfront cost

The Subcommittee discussed acoustic efforts to mitigate sound from the HVAC system. Costs were not available.

Mr. Aries stressed the importance of a backup heat source in case there are issues. There are currently 2-3 boilers available as backups in all school buildings.

Rainwater Cistern Review

Rainwater cistern irrigation would cost \$140k

- Utilizing native plants and water efficient irrigation methods can minimize the need for excessive water

- Harvesting rain water: Effective and educational for a small area
- The heaviest rain events in spring vs. Most need for irrigation is during July / August. The tank can never be large enough to meet peak demands
- Supplemental water necessary to meet irrigation needs.
- Cistern / tank water needs treatment to potable water standards. Increased annual operating and maintenance costs
- Will not achieve payback
- Potential for increased cost due to possible ledge
- 40,000 gallon tank
- Ten to twelve-feet below grade
- Annual water savings: 595,000 gallons
- 15% of water demand met

Decision Points – Overview

1. Priority: 20% above new energy code to achieve 2% points from MSBA--\$83.3M
2. Heating / Cooling System options:
 - a. Baseline: Natural gas—Included
 - b. Tier-1: Water source heat pump with supplemental electric boiler—Add \$1.1M
 - c. Tier-2: Ground source heat pump (Geothermal)—Add \$3.5M
 - d. Tier-3: Ground source heat pump (Geothermal) with supplemental electric boiler, less wells—Add \$3.5M
3. 100% air conditioning vs. partial air conditioning and dehumidification ventilation--\$1.3M
4. Rainwater cistern irrigation--\$0.2M
5. Possible max--\$88.3M

The Subcommittee discussed the benefits of a natural gas baseline system. Mr. Bayer supported getting off of fossil fuels as it allows for greater flexibility in the future.

Mr. Fitzgerald indicated that a final decision needs to be made in September or October, ahead of schematic design.

The Subcommittee continued discussion on the cost-benefits of each tier. There was consensus in supporting full air conditioning, allowing for greater flexibility in the uses of the building throughout the year.

Mrs. Plotkin then informally surveyed the Subcommittee on their opinion of the rainwater cistern irrigation system. Mr. Cummings was the lone member that wished to proceed.

Action Items

Recommendation to Full School Building Committee on HVAC Option and Rainwater Cistern

Mr. Mullin made a motion to recommend either Tier-2 or Tier-3 heat source systems to the School Building Committee. Seconded by Mr. Aries.

Roll-Call Vote:

Mrs. Plotkin	Yes
Mr. Aries	Yes
Mr. Bayer	Yes

Mr. Cummings	Yes
Mrs. Hyde	Yes
Mr. Mullin	Yes

Vote: 6-0-0.

Result: Approved

Mr. Aries made a motion to recommend 100% air conditioning for the building. Seconded by Mr. Cummings.

Roll-Call Vote:

Mrs. Plotkin	Yes
Mr. Aries	Yes
Mr. Bayer	Yes
Mr. Cummings	Yes
Mrs. Hyde	Yes
Mr. Mullin	Yes

Vote: 6-0-0.

Result: Approved

Mrs. Hyde made a motion that the recommendation to the School Building Committee be that there is no rainwater cistern. Seconded by Mr. Aries.

Roll-Call Vote:

Mrs. Plotkin	Yes
Mr. Aries	Yes
Mr. Bayer	Yes
Mr. Cummings	No
Mrs. Hyde	Yes
Mr. Mullin	Yes

Vote: 5-1-0.

Result: Approved

Approval of July 8, 2020 Minutes

Mrs. Hyde made a motion to approve the meeting minutes of July 8, 2020. Seconded by Mr. Aries.

Roll-Call Vote:

Mrs. Plotkin	Yes
Mr. Aries	Yes
Mr. Bayer	Yes
Mr. Cummings	Yes
Mrs. Hyde	Yes
Mr. Mullin	Yes

Vote: 6-0-0.

Result: Approved

New Business

There was no new business.

Adjournment

Mrs. Hyde made a motion to adjourn the meeting. Seconded by Mr. Aries.

Roll-Call Vote:

Mrs. Plotkin	Yes
Mr. Aries	Yes
Mr. Bayer	Yes
Mr. Cummings	Yes
Mrs. Hyde	Yes
Mr. Mullin	Yes

Vote: 6-0-0.

Result: Approved

The meeting adjourned at 9:32am.

Documents and Exhibits Used at Meeting

- Draft Sustainability Subcommittee meeting minutes of July 8, 2020
- Engineering Economic Analysis prepared by Garcia, Galuska, and DeSousa, dated August 14, 2020
- Presentation slides by Dore and Whittier, dated August 18, 2020
- Wahaso (Water Harvesting Solutions, Inc.) Water Balance Analysis Summary, dated May 7, 2020