

**Concord Middle School Building Committee
Sustainability Subcommittee
Meeting Minutes
April 29, 2020**

Present: Mike Carroll (Hill International), Frank Cannon, Kate Hanley, Russ Hughes, Laurie Hunter, Charlie Parker, Matt Root, Laurie Hunter, Martine Dion.

Call to Order

Mr. Root called the meeting to order at 12:04 AM as a Zoom Conference call.

Review of sustainability requirements

Matt initiated the review by indicating that the goal of the committee was to agree on set of sustainability recommendations that could be submitted to the overall Building Committee on April 30.

Cost of Ownership:

Martine reviewed recent slides on cost of ownership with focus on option 3 (Tree Tops conceptual design). Most of discussion centered on the insulation package with the better triple glazing, plus ASHP, and electric options (plug controls and efficiency measures). Noteworthy data includes:

- Compared to a natural gas system, an all-electric system using Air Source Heat Pumps costs \$1,046,971 less than a natural gas boiler system combined with a conventional air conditioning system.
- Selecting a higher grade of insulation and windows for the building (slab, walls, ceiling) and triple glazed windows provides additional savings (\$95,763) due to additional reductions in mechanicals sizing because of reduced heating requirements.

High-level requirements presented by Matt include (most are referenced in the SMMA package 'Pricing Options':

- Commit to all-electric design
- Commit to enhanced insulation package
- Commit to triple glazed windows but not to the more expensive package
- Maintain Window to Wall Ratio (WTWR) at higher level (30%); however, consider reductions to WTWR as we work through schematics. Note that reducing WTWR provides significant savings (reduction from 30% to 25% saves \$306,780).
- Increase air sealing to ensure an aggressive approach and positive outcome by doubling air sealing investment by ~\$80,000 to ~\$160,000. This is a very conservative approach to ensuring a successful outcome on this metric.
- Increase level of plug controls to 90% (allows programmatic control over usage of electricity in each room vis room outlets.
- Add \$170,000 for Passive House Review and Certification

Martine commented on the criticality of commissioning. Base plan already includes 'enhanced commissioning'; however, the additional review under Passive House processes is 'added insurance' to get the desired outcomes. The first \$80,000 incremental adds 10% to air sealing effort and gets us to 0.1 or 0.15, while extra \$80,000 investment gets us closer to 0.08cfm. This needs more discussion to determine how it is handled and to optimize its benefit. Martine mentioned that one possibility is to include additional testing into the bid requirements.

Costs of identified sustainability options is ~\$930,000 for those options that were presented to us for review. These costs will be less if the WTWR is reduced. And, a second possible area for savings is the cost of the generator which has incremental capacity to support an all-electric design (additional sizing = \$465,000).

As detailed by Martine in her presentation on April 29th, payback between business as usual (gas boiler/stretch code envelope) and our goal with the investments detailed above is ~7 years. This takes us from an EUI of 56 with natural gas to an EUI that's less than half that amount: our goal of EUI = 25. Using a baseline of electric as opposed to gas gives us a payback of ~4 years.

Additional questions from Matt focused on the \$200,000 SMMA line item for enhanced commissioning; Matt suggested that we need to better understand what's included. Martine recommended that we attempt to simplify which elements are included under enhanced commissioning and under Passive House Review for achieving the building tightness goals. We need to be sure that we avoid change orders but we need to include appropriate process to achieve the 0.08cfm goal.

Kate Hanley reminded everyone that one of the follow-ups is to determine the strategy for rainwater capture and reuse. This is a next step.

Motion made by Kate Hanley that the 'Strategy Document' presented by Matt be submitted to the entire Building Committee for adoption. Motion passed unanimously. Strategy Document is included below in its entirety:

Strategy Document Presented to Subcommittee on April 29th, 2020

CMS Sustainability Subcommittee

Conceptual Design Pricing Recommendations - Net Zero Energy Ready Package

- The following package is a set of design recommendations based on the conceptual design pricing information released to date that combine to best balance the net zero energy ready goals of the project with costs. This set of recommendations is not an "a la carte" menu of options, but must be advanced as a package in order to maximize offsetting costs/savings (e.g. a better enclosure with smaller mechanical systems). At present, based on initial energy modeling by SMMA, this package provides a 9.1 year simple payback when compared to the baseline (stretch energy code and LEED silver) with a natural gas boiler and a 5.6 year simple payback when compared with an electric air source heat pump.
- This package is energy efficient, but more importantly it will improve the educational learning for all students, and it will provide a healthier environment for all of the building's occupants. It will also reduce the operational and maintenance costs and provide a more comfortable space as well as a more resilient building.
- We believe this package will set the project on a path to achieve the energy goals called for by the community, as listed in the amendment to the approval for the funding of the design work approved at last year's Town Meeting, and also as outlined in the Project Charter.
- Unless otherwise noted, the following enhanced sustainability options and associated cost estimates come from the Summary CMS Reconciliation dated 04-17-2020 for Option #3.
 1. A1 – Roof Insulation: Accept increase in insulation from 8" to 10" (+\$205,000).
 2. A2 – Wall Insulation: Accept increase in insulation from 6" to 8" (+\$152,000).
 3. A3 - Air sealing: Accept increase labor in taping (+\$80,000).
 - a. Increased air sealing is critical to performance. Recommend doubling the initial air sealing forecast to a total of +\$160,000 to ensure achievement of a stringent airtightness metric – 0.08 cfm75/square foot of shell area.
 - b. Enhanced enclosure commissioning and construction mockup air leakage testing will be critical to achieving this air tightness metric.

4. A4 - Under slab insulation: Accept increase in insulation from 2" at the perimeter and 1" in the middle to 3" everywhere (+\$238,000).
5. A5 – Windows: High performance windows will be critical to maintaining occupant comfort and allowing the mechanical system to be downsized (cost savings). The right balance between cost and performance will be fully explored, but carry option A5 for now (+\$600,000).
 - a. Under no circumstance will the Sustainability Subcommittee advocate for an option that costs in the ballpark of A7 (\$3,000,000).
 - b. Window estimates appear high and the expectation is that prices will come down between now and bidding.
 - c. Efforts will be made to minimize the cost associated with windows. For example, tuning the amount of glazing to balance daylighting and efficiency. A maximum window to wall ratio of 30% is acceptable for now, with the expectation that the Design Team may reduce this ratio as the design is developed. A8 identified a cost savings of -\$307,000 at a window to wall ratio of 25%, a savings which is not included in the current NZE Ready Package.
6. M1 - All-electric HVAC design: Accept Air Source Heat Pump (ASHP) and commit to an all-electric HVAC system. This step provides significant first cost savings over a natural gas boiler system (-\$1,000,000). Insulation and air sealing is critical to ensure the operating costs of the ASHP system are not significantly higher than a boiler system.
 - a. A Ground Source Heat Pump (GSHP), or hybrid ASHP/GSHP, can be explored as the project progresses in design.
 - b. A radiant floor distribution system (included in M2) is not recommended as it is too expensive and is not the right mechanical system type for a high-performance building.
7. M3 – HVAC Downsizing: Accept credit for reducing the size of the HVAC system because of the smaller loads that result from accepting A1-A5 (-\$95,000).
8. E1 – Plug Loads: Accept increase in plug load controls from 50% to 75% (+\$57,000).
 - a. Recommend increasing plug load controls from 75% to 90% - extrapolate cost estimate = +\$35,000 (+\$92,000 for total enhancement).
9. E4 Higher Efficiency Equipment: Needs clarification. What equipment does this cover?
10. E5 – Generator Requirements: Accept as an apparent cost increase for an all-electric HVAC system (+\$466,000)
 - a. Appears to be an opportunity to reduce the cost from the initial estimate – a super-efficient building does not have a lot of heat loss and therefore does not need a lot of backup capacity.
11. Design Review:
 - a. Accept high-performance design support, including Passive House energy modeling and thermal bridging analysis.
 - b. Schematic Design: +\$26,150¹
 - c. Design Development: +12,000¹
 - d. Construction Documents: +\$27,000¹
12. Commissioning:
 - a. The baseline is carrying \$200,000 for commissioning. Further information on the level of commissioning this includes is required.
 - b. Accept +\$50,000¹ for "construction review/testing", which we interpret to include enhanced enclosure commissioning and mockup air leakage testing.

¹ Pricing based on the Feasibility Study Pricing Options Memorandum issued by SMMA on 4/13/2020 v2

c. Accept +\$15,000¹ for whole building air leakage testing (blower door testing).

13. Certification

a. Passive House registration: +\$20,000¹

b. Passive House certification: +\$20,000¹

APPROVED

Summary

| | <u>Package Items</u> | <u>Option</u> | <u>AM Fogarty Cost</u> |
|----|-----------------------------------|---------------------------------|------------------------|
| M1 | HVAC | ASHP/DOAS | \$ (1,046,972) |
| A1 | Roof insulation | 10" | \$ 204,100 |
| A2 | Wall insulation | 8" | \$ 151,241 |
| A3 | Air sealing | 10% additional | \$ 79,601 |
| A4 | Under slab insulation | 3" | \$ 237,055 |
| A5 | Glazing | Triple glazing | \$ 596,605 |
| M3 | Adjustment to A1-A5 | Package | \$ (95,763) |
| E1 | Plug Load Controls | 75% coverage | \$ 56,525 |
| E5 | Generator | 500kW | \$ 465,000 |
| | | | |
| | <u>Incremental to package</u> | | |
| | Additional air sealing | Target metric 0.08 cfm75/sq.ft. | \$ 79,601 |
| | Additional plug load controls | 90% coverage | \$ 34,200 |
| | | | |
| | <u>Testing and Review</u> | | |
| | Soft costs and certification fees | SMMA (4/13) | \$ 170,150 |
| | | | |
| | Grand Total | | \$ 931,343 |

Next Steps

1. Model Option #3 in the Passive House software
2. Further develop ventilation conceptual design options
3. Investigate Plumbing Enhanced Sustainability Options
4. Review cost estimate for enhanced enclosure commissioning

Minutes prepared by Charlie Parker, May 12, 2020