

Concord Middle School Building Committee
Meeting Minutes
April 30, 2020

PRESENT: Laurie Hunter, Tim Hult, Dawn Guarriello, Court Booth, Heather Bout, Pat Nelson, Matt Root, Susan Bates, Charles Parker, Stephen Crane, Justin Cameron, Russ Hughes, Jared Stanton, Chris Popov, John Harris, Kate Hanley

ABSENT: Frank Cannon

PRESENT FROM HILL INTERNATIONAL: Peter Martini, Mike Carroll, Andy Vo, Mark Morin

PRESENT FROM SMMA/EWING COLE: Kristen Olsen, Matt Rice, Martine Dion, Keith Fallon, Bill Smarzewski, Saul Jabbawy.

MEETING ORGANIZER: Chris Carmody

Call to Order

Tim Hult called the meeting to order at 7:35 A.M. via Zoom Virtual Conference call. A recording of the meeting will be made available at the Concord Public School's project page and Town of Concord's website.

Approval of Minutes

Approval of the Building Committee Meeting Minutes from April 23, 2020 was motioned by Court Booth and seconded by Dawn Guarriello. A roll call vote of committee members yielded a unanimous approval.

Feasibility Estimating

Mike Carroll (Hill International) presented an updated estimate for Concept #3 *Tree Top Teams*. The updated estimate reflected an acceptance of proposed value engineering items (-\$6,517,342) and an enhanced sustainability package (+\$937,542) recommended by the Sustainability Subcommittee. With these adjustments, the updated total project cost for Concept #3 stands at \$101,792,530 assuming a Chapter 149 project delivery method. Further detail can be found in the attached documents.

Value Management Log

Mike Carroll (Hill International) presented progress made with the value engineering (VE) efforts. A list of recommended VE items compiled by Hill and SMMA was presented. Net cost savings of recommended items equated to -\$6,517,342 (not inclusive of 25% soft cost markups). A breakdown of the proposed value engineering items rolled up into major categories can be found in the attached Value Management Log.

Sustainability

Matt Root (Subcommittee Chair) presented progress made by the Sustainability Subcommittee (SSC) on enhanced sustainability. A Net Zero Ready recommendation letter, drafted and unanimously approved by SSC members, was presented. This letter outlines a package of enhanced sustainability that meets the Building Committee's Net Zero Ready objective. A summary of costs, derived from current Feasibility Estimates, totals the recommended package at \$937,542. Matt Root noted the costs do not reflect the installation of Solar Photovoltaics. The SSC recommends the town seek installation of Solar Photovoltaics

outside of the project and the building be designed in preparation for such installation. Matt reiterated that costs/savings associated with the Net Zero Ready recommendation will continue to develop as the design progresses. Further detail can be found in the attached SSC Recommendation Letter.

Martine Dion (SMMA) presented information on preliminary annual operational cost savings and payback periods for systems approaches that include natural gas as well as all electric mechanical systems. Net Zero Energy Ready operational savings when compared to MA Stretch Code equated to -\$103,451/year for a natural gas system and -\$168,766 for all electric mechanical systems. Martine confirmed these values do not include saving from Solar Photovoltaics. Further detail can be found in the attached presentation slides.

Building Pricing Options (Gymnasium & Auditorium)

Mike Carroll (Hill International) presented current estimated costs for the Gymnasium and Auditorium pricing options. CMSBC members were given an opportunity to provide comment. Tim Hult reiterated the committee's appreciation for the thoughtful letters forwarded by the community. Laurie Hunter expressed the music department is currently reviewing if square-footage currently set aside in the base building program could be reduced if a performance space such as an auditorium or black box theater were provided. Further detail of this conversation can be found in the posted recording.

The building committee expressed their challenges with collecting community feedback during the ongoing pandemic. CMSBC Leadership will be reviewing the current status of the project and will communicate next steps for approval of Feasibility Package and transition into Schematic Design.

Upcoming Meetings

Dates for upcoming CMSBC and Subcommittee meetings have yet to be established. Dates will be posted once available.

Adjournment

Tim Hult requested the meeting adjournment at 9:28 AM. Pat Nelson made the motion to adjourn, Chris Popov seconded the motion. The motion carried unanimously.



	<i>Concept 3 Tree Tops Teams Base Concept</i>	<i>Concept 3 Tree Tops Teams with adjustments</i>
PROGRAM		
Enrollment	700	700
Total Area of New Construction	<u>144,005 sf</u>	<u>144,005 sf</u>
Construction Start	Fall 2021	Fall 2021
Construction Duration	2 Years	2 Years
Completion	Fall 2023	Fall 2023

DESIGN CONSTRUCTION COSTS ESTIMATES		
New Construction Costs	\$65,717,723	\$65,717,723
Design Contingency	\$7,886,127	\$7,886,127
Escalation	\$3,943,063	\$3,943,063
GCs, GRs, Insurance Fee, & Bond	\$9,305,630	\$9,305,630
VE Accepted	\$0	-\$6,517,342
Pricing Options Accepted (Site/Building)	\$0	\$0
Pricing Options Accepted (Enhanced Sustainability)	\$0	\$761,694
Total Cost assuming Chapter 149	\$86,852,542	\$81,096,894
Cost per Square Foot	\$603 /sf	\$563 /sf

ADMINISTRATION		
Legal Fees	\$40,000	\$40,000
Other Admin Fees	\$150,000	\$150,000
Owner's Project Manager	\$3,039,839	\$2,838,391
Subtotal	\$3,229,839	\$3,028,391

ARCHITECTURE & ENGINEERING		
Architect	\$8,685,254	\$8,109,689
Construction Testing	\$175,000	\$175,000
Printing	\$25,000	\$25,000
Other Administrative Costs	\$60,000	\$60,000
Misc. Specialties Design Consultants	\$100,000	\$100,000
FF&E Design, Receipt and direction	\$150,000	\$150,000
Hazardous Materials	\$150,000	\$150,000
GTECH/GeoEnvironmental	\$100,000	\$100,000
Site Survey	\$50,000	\$50,000
Subtotal	\$9,495,254	\$8,919,689

MISCELLANEOUS PROJECT COSTS

Utility Company Fees		\$200,000	\$200,000
Commissioning		\$200,000	\$200,000
Enhanced Commissioning		\$0	\$170,000
Other Project Costs - mailing moving		\$200,000	\$200,000
	Subtotal	\$600,000	\$770,000

FURNISHINGS & EQUIPMENT

FFE Allowance (carry \$2000/stdnt vs MSBA \$1200)	\$2,000 /student	\$1,400,000	\$1,400,000
Technology (carry \$2000/stdnt vs MSBA \$1200)	\$2,000 /student	\$1,400,000	\$1,400,000
	Subtotal	\$2,800,000	\$2,800,000

OWNER'S CONTINGENCY

Percentage of Construction Cost	5.5%	\$4,776,890	\$4,460,329
Percentage of Soft Cost	5.5%	\$886,880	\$853,494

PROJECT BUDGET

	PROJECT TOTALS	\$108,641,405	\$101,928,798
	Soft Cost %	25.09%	25.69%
Chapter 149A Increase	7.5%	\$116,789,511	\$109,573,458



Value Management Log



Feasibility Design Documents

A	B	C	D	E	F	G	N	O	Q	R
Item #	Ext.	VE/VM Item	Trade	Ed Prog.	Sustain	App. To Conc. #3	Cont./Markups (24.8%) 2	Status	Accepted Value w/ Markup	Rejected Value
Contingency Items				NO	NO	YES	(\$3,316,159)	Accept	(\$3,316,159)	
Building Massing				NO	NO	YES	(\$1,278,938)	Accept	(\$593,943)	
Exterior Envelope				PTNL	PTNL	YES	(\$1,805,372)	Accept	(\$1,306,172)	
Interior Architectural Changes				YES	NO	YES	(\$1,967,222)	Accept	(\$343,574)	
Sitework				NO	PTNL	YES	(\$988,070)	Accept	(\$957,494)	
Other Items Still Under Consideration for Schematic Design				PTNL	PTNL	YES	(\$14,647,923)	Under Review	\$0	
Items Rejected				NO	NO	YES	(\$748,800)	Reject	\$0	
TOTALS							(\$24,752,484)		(\$6,517,342)	(\$600,000)

- Notes:
1. Estimated values are not inclusive of Indirect GC and contingency costs.
 2. Contingency & Markups Breakdown

Design Contingency **12.0%**

Escalation **5.8%**

General Requirements **2.5%**

Building Permit **0.0%**

P&P Bond & Insurance **2.0%**

Profit **2.5%**



Pricing Options		144,005. sf	
		RECONCILED VALUE	Sustainability Options Accepted
Program Area		Cost	
Site Options			
S1	Alternate for septic system nitrogen removal down to 10 mg/l (this cost is at least \$200,000+) Site is within groundwater overlay district and near Town Water Land with municipal well. This may be in addition to the septic components discussed above.	\$332,500	
S2	Include 3 tennis courts (24,000 sf) in lieu of the 24,000 sf Open Lawn Intramural Area.	\$346,327	
S3	Include 28,350 sf of porous pavement substituted for an equivalent portion of the Bituminous Concrete Pavement for Roadways noted above.	\$47,132	
S4	Additional EMS access to the backside of the building. Assume approximately 700' x 20'	\$118,475	
Building Options			
Gymnasium - Base = 6,000 sqft HS Main Court w/ 200 Person Bleacher		\$0	
A1	8,600sf Gymnasium - HS Regulation main basketball court, (2) non-regulation cross courts, bleacher seating +/-320 people.	\$1,040,000	
A2	13,400sf Gymnasium - High School sized main court, (2) regulation HS cross courts and bleacher seating for +/- 200 people.	\$3,478,000	
Performance Space - Base = Cafetorium w/ 1,600 NSF Stage		\$0	
B1	Black Box - 4,000 NSF theater w/ 750 NSF Support Space. +/- 400 person seating capacity.	\$1,811,250	
B2	1-Grade Level Auditorium - 3,600 NSF w/ 750 NSF Support Space. +/- 275 person Seat Capacity.	\$3,262,500	
B3	2-Grade Level Auditorium - 6,600 NSF w/ 750 NSF Support Space. +/- 550 person Seat Capacity.	\$5,512,000	
Enhanced Sustainability Options (Architectural)			
A1	Adjust Roof Insulation from 8" ci poly-isocyanurate:		
	a. to 10" ci poly-isocyanurate.		
	Concept #3	\$204,100	\$204,100
A2	Adjust Wall Insulation from 6" mineral wool		
	a. to 8" mineral wool		
	Concept #3	\$151,241	\$151,241
A3	Adjust AVB from Typical type GCP VPL 50 with transition strips (Note code requires an airtight taped AVB New C406 requires 0.25 cfm/SF @ 75 PA)		
	a. increasing taping by 10%		
	Concept #3	\$79,601	\$79,601
A4	Under slab insulation Adjust from 2" extruded polystyrene inside foundation wall and 4ft in under slab. 1" extruded polystyrene under remainder of slab		
	a. to 3" outside foundation wall & 3" fully continuous underslab		
	Concept #3	\$237,055	\$237,055
A5	Adjust windows from High Performance double glazed (U-value of 0.32 or better, unit U-value of 0.25 or better, SHGC 0.37)		
	a. To High Performance triple glazed (U-value of 0.22 or better, unit U-value of 0.14, SHGC 0.35) with 3 panes of glass (Note Curtain wall in aluminum, but punch windows have been changed to Fiberglass)		
	Concept #3	\$596,605	\$596,605
A6	Adjust windows from High Performance double glazed (U-value of 0.32 or better, unit U-value of 0.25 or better, SHGC 0.37)		
	a. To High Performance triple glazed (U-value of 0.22 or better, unit U-value of 0.14, SHGC 0.35) with 2 panes of glass and a "light pane" (non-glass) as the middle layer (Note Curtain wall in aluminum, but punch windows have been changed to Fiberglass)		
	Concept #3	\$494,261	
A7	Adjust windows from High Performance double glazed (U-value of 0.32 or better, unit U-value of 0.25 or better, SHGC 0.37)		
	a. To High Performance triple glazed (U-value of 0.14 Passive House Certified Glazing systems**, unit SHGC 0.35)		
	Concept #3	\$2,194,168	
A8	Adjust Window to Wall ratio from 30% of the exterior wall area is glazing systems of which: 50% of punched window and 50% of Curtain wall.		



Pricing Options		144,005. sf	Sustainability Options Accepted
		RECONCILED VALUE	
Program Area	Cost		
a. To Wall ratio of 25% of the exterior wall area is glazing systems of which: 50% of punched window and 50% of Curtain wall			
Concept #3	-\$306,780		
A9 Price aluminum-clad window in-lieu of base system			
Concept #3	\$255,859		
Enhanced Sustainability Options (Plumbing)			
P1 Adjust bathroom fixtures from standard low flow fixtures	\$0		
P2 Include a 15,000-gallon rainwater harvesting system, complete. Assume fiberglass tank, below-ground filtration system, submersible pump system, and calming inlets.	\$0		
Enhanced Sustainability Options (HVAC)			
M1 HW/CHW Plants with 4-Pipe FCUs & DOAS			
M2 VRF & DOAS	-\$1,046,971		-\$1,046,971
M3 Geothermal, Radiant Floor Heating, HW/CHW Plant, DOAS Displ. Ventilation	\$5,664,391		
M3 Adjust size of HVAC Systems down due to accepting options A1- A5 Assumed System Heating and cooling adjusted by XXXX	-\$95,763		-\$95,763
Enhanced Sustainability Options (Electrical)			
E1 Adjust base Plug load Controls from 50% Plug load controls to	\$0		
a. 75% Plug Load Controls (may not have any cost impact)	\$56,525		\$56,525
E2 Adjust base building lighting controls to include coordination with light sensors and daylighting (In Base)	\$0		
E3 Adjust window shades to include automatic shades, with lighting control and daylight sensing	\$369,075		
E4 Adjust specifications on equipment to higher energy efficiency requirements.	\$0		
E5 Generator Requirements = 300 kw included in base - increase to 500 kw for electric heat	\$465,500		\$465,500
E6 Adjust electrical systems to include photovoltaics to cover up to 50% of the mean energy requirements (600 kw to power 50% Building)	\$2,354,100		
E7 Adjust electrical systems to include photovoltaics to cover up to 100% of the mean energy requirements. (1.2MW to power Building)	\$5,226,900		
E8 Adjust photovoltaic system to include onsite battery storage	\$166,250		
Adds from Sustainability Subcommittee - Added Air Sealing			\$79,601
Adds from Sustainability Subcommittee - Added Plug Loading			\$34,200
	\$0	totals	\$761,694
	\$0		
Net Zero Building (including A1, A2,A3, A4, A6, M2, E1, & E5)			
Concept 3	\$641,312		
Passive House Building (including A1, A2, A3, A4, A7, A8, M2, E1 & E5)			
Concept 3	\$2,034,439		

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 widow 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.
 - 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

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

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

NZE & PH INCREMENTAL COSTS - SUMMARY

	Fogarty				PMC	Comments
	Option 1	Option 2	Option 3	Option 4	All options	
Incremental Costs - NZE Ready	Opt 1	Opt 2	Opt 3	Opt 4	All options	
NZER Enclosure (with Glazing A5)	\$1,565,593	\$1,295,990	\$1,268,602	\$1,358,472	\$1,206,171	Alt. A1-A5
NZER Enclosure (with Glazing A6)	\$1,430,486	\$1,194,045	\$1,166,258	\$1,263,310	\$1,003,761	Alt. A1-A4 + A6
NZER Enclosure (w. A5)/Electical/VRF	\$1,040,947	\$771,344	\$743,956	\$833,826	\$1,093,661	Alt. A1-A5 + VRF + Electrical
NZER Enclosure (w. A6)/Electrical/VRF	\$905,840	\$669,399	\$641,612	\$738,664	\$891,251	Alt. A1-A4 +A6 + VRF + Electrical
NZER Enclosure (w. A6)/Electrical/GSHP	\$7,617,202	\$7,380,761	\$7,352,974	\$6,896,513	\$4,779,386	Alt. A1-A4 + A6 + GSHP + Electrical
Incremental Costs - Passive House³	\$3,143,465	\$2,362,656	\$2,341,519	\$2,318,871	\$1,599,686	with NZER enclosure, Electrical & VRF
First Costs Savings (heating plant reduction)	TBD	TBD	TBD	TBD	(200,000)	under review
Operational savings - (NZER savings over MA Stretch Code)						
Stretch Natural gas (NG) Heating	(\$103,451)	(\$103,451)	(\$103,451)	(\$103,451)	(\$103,451)	natural gas heating - EUI 56
Stretch All electric	(\$168,766)	(\$168,766)	(\$168,766)	(\$168,766)	(\$168,766)	all electric Stretch Code EUI 50

Notes:

1. Electrical Costs and Natural Costs based in EIA: \$0.16/kWh & \$1.25/Therms
2. Utility Costs do not include cost escalation
3. We are assuming the Passive House costs are incremental to the MA Stretch Code baseline
4. NZER: Net Zero Energy Ready - does not include

SUMMARY NZE & PH PAYBACK ANALYSIS

Net Zero Energy Ready Cost Options	Stretch Code Options	Simple Payback (without cost escalation)					Comments
		(Years)					
		Fogarty				PMC	
		Option 1	Option 2	Option 3	Option 4	All options	
<u>NZER Enclosure (w. Glazing A5)</u>	NG	15.1	12.5	12.3	13.1	9.7	
<u>NZER Enclosure (w. Glazing A6)</u>	All-Elect.	8.5	7.1	6.9	7.5	4.8	
<u>NZER Enclosure (w. A5)/Elect./VRF</u>	NG	10.1	7.5	7.2	8.1	8.6	
<u>NZER Enclosure (w. A6)/Elect./VRF</u>	All-Elect.	5.4	4.0	3.8	4.4	4.1	
<u>NZER Enclosure (w. A6)/Elect/GSHP</u>	NG	73.6	71.3	71.1	66.7	46.2	
<u>NZER Enclosure (w. A6)/Elect/GSHP</u>	All Electr.	45.1	43.7	43.6	40.9	27.1	
<u>Passive house</u>	NG	30.4	22.8	22.6	22.4	15.5	
	All Electr.	18.6	14.0	13.9	13.7	9.5	
NG: Natural Gas Heating							
All Electr.: All-Electric Heating							

Alternatives Cost Estimates Summary

		Fogarty				PMC			
		Option 1	Option 2	Option 3	Option 4	All options			
Exterior Assembly (A1-A5 total)		\$1,565,593	\$1,295,990	\$1,268,602	\$1,358,472	\$1,206,171			
NZER Enclosure (A1-A4)		\$774,909	\$701,779	\$671,997	\$804,959	\$531,471	Incl NZER roof/walls/AVB/underslab insulation		
Triple Glazing	A5	\$790,684	\$594,211	\$596,605	\$553,513	\$674,700			
	A6	\$655,577	\$492,266	\$494,261	\$458,351	\$472,290			
	A6-A5 (delta)	(\$135,107)	(\$101,945)	(\$102,344)	(\$95,162)	(\$202,410)			
Passive House		\$2,893,202	\$2,185,523	\$2,194,168	\$2,038,558	\$1,180,725			
Electrical (NZER)	Plug loads	\$56,525	\$56,525	\$56,525	\$56,525	\$15,500			
	Generator	\$465,800	\$465,800	\$465,800	\$465,800	\$160,000			
Mechanical	VRF	(\$1,046,971)	(\$1,046,971)	(\$1,046,971)	(\$1,046,971)	(\$288,010)			
	GSHP	\$5,664,391	\$5,664,391	\$5,664,391	\$5,664,391	\$3,600,125			