
CONSTRUCTION PROJECTS COMMITTEE
THURSDAY, MAY 28, 2009
6:00 P.M.
NASHUA HIGH NORTH LECTURE HALL

A meeting of the Construction Projects Committee was held at Nashua High North on **Thursday, May 28, 2009**. Alderman McCarthy called the meeting to order at **6:10 p.m.**

Present: Alderman McCarthy, Alderman Tabacsko, Mr. Dowd, Mr. Kelley, Mr. Hallowell

Also Present: Mr. Mealey, Mr. Smith, Mr. Haas, Mr. Vaughan, Alderman Teeboom
Jordan Institute

DISCUSSION: Jordan Institute Report

Mr. Smith

We have a variety of gentlemen from the Jordan Institute to speak to us and you should have a copy of a report dated 5/22/09 in your package. I would suggest that Mr. Henry speak to us about where they stand.

Mr. Henry

With me tonight are Gary O'Connell, John Gaston and David Rice. We've reviewed the Turner geothermal stuff, taken a look at another school's displacement system, looked at the air source heat pump estimates and done a number of on site visits.

At this point we're essentially looking at 2 types of gas boilers and the associated distribution systems. We're going to take a look at conventional cast iron gas boilers and they would again, have outdoor reset and be modulating. And also look at condensing gas boilers. The important thing to recognize about that is that if we go with a conventional gas system, we will have to add an AC system in addition to meet your AC demands and we're estimating that would be about a 200 ton system. So that's a pretty big AC unit for that.

The comparison is to look at the 3rd option, which is the air source heat pumps, which would give us both the heating and the AC. And we would have some sort of supplemental heating system for the colder times. We'll also be looking at the ventilation system and probably using energy recovering ventilators. We're looking at maybe segmenting the school in 7 different districts for the air source recovery. So the smaller units would be handling each portion of this school that has all these fingers sticking out from them.

The interesting thing is that the price of natural gas is really low. Oil and gas are really totally decoupled now... which is something we haven't really ever seen before. Today oil went over \$65 a barrel, and gas is still down at \$3.90 a million BTU's. There's a big spread there and one of the things you're going to have to think about looking out 15 or 20 years is, what are your guess on the relative costs of gas and electricity? That's where we're at on the heating and cooling alternatives and their exchange opportunities.

Alderman McCarthy

With regard to the air source heat pump system, for the supplemental days are you thinking of gas powered boilers or electric radiant...?

Mr. Gaston

What the Europeans are doing in colder climates is that they are incorporating a resistance heat element in the air pump itself. So they're really preconditioning the condenser, which keeps the COP and efficiency of the unit up. So it's quite a simple solution and they do that electrically. In your case, you won't lose a lot of efficiency because Nashua is located where you're not exposed to too many extremely cold days (minus 10 degrees). They work pretty well down below zero, but after that the resistance heat comes on.

We're working on the numbers now, but here in Nashua, natural gas is going to be hard to beat. It comes down to predictability and what's going to happen in the future. So when you're putting in the financial model's various factors that effect fuel cost, those are going to become much more important in those models because of the low cost of gas right now.

I think we've looked at all the options on location for these. And it looks like the best location is on the ground on concrete pads. That means they'll have to be enclosed in fencing so no one can get to them.

Alderman McCarthy

I assume we'll get a much more detailed report from you.

Mr. Henry

Absolutely, and we were going to ask if we could have that ready for you in two weeks. I believe our due date was June 2nd, but we could use another couple of weeks to finish up that final report if that's okay.

Alderman McCarthy

At this point I think we'd rather see that correct than early.

Alderman Teeboom

For the minutes, you will take a look at 3 alternatives: Geothermal, natural gas and air source heat pumps. You mentioned air source heat pumps, you mentioned natural gas, but you didn't say anything about geothermal. You were supposed to look at the Turner data.

Mr. Henry

We have looked at the Turner data. I came away from the last meeting with the district feeling that you didn't want us to dig any deeper into the Turner data. We will certainly put that on the cost comparisons on the final report. But we are essentially taking the Turner data at more or less face value. I have to say, we have some questions about the COP claims that they're making.

Alderman Teeboom

The Turner design is a particular design that we've been called central air displacement. It's a very particular design and might be somewhat inefficient. There are other designs possible as well. Are you saying that we're just going to stay for comparison? I want to make it clear this is understood. I'm not saying I'm for or against this, but is this clearly understood?

Alderman McCarthy

If I can paraphrase what I understand the answer of that to be... is you've looked at the Turner design and also thought about what Alderman Teeboom would call a more traditional geothermal system. And that when compared to the air source heat pumps, the source side is much more inexpensive in the air source heat pumps, and the demand side is basically the same. So for systems with a similar COP, which they would have, the air source heat pumps are dramatically less expensive than sinking wells for ground source heat.

Mr. Henry

Absolutely. The capital cost in the air source heat pumps is significantly lower than the geothermal option.

Alderman Teeboom

Then why are we looking at the geothermal option at all?

Alderman McCarthy

Just so we can have data that says we looked at it and it is not a reasonable solution.

Alderman Teeboom

Any opinion from anybody? I'd like to hear someone else's opinion.

Mr. Hallowell

In fact when we talked to them, I believe you were one of the proponents, as was I that we have the data, we might as well put the comparison in. I think it's by our request that they're doing the comparison.

Alderman McCarthy

Let the record show that Mr. Dowd has joined us.

Mr. Henry

So now if we can turn to the envelope issues. We have done the blower door test and we have the blower door report and a picture. Because we're essentially seeing 4-5 areas that need significant improvement in the envelope. And whatever option we use on the heating/cooling side by reducing the demand by improving the envelope, we can reduce the capital cost of whatever alternative ends up being chosen.

The areas I'm going to talk about are air ceiling, reducing window fenestration; insulation for both the roof and the foundation slab; dealing with exterior doors and exploring possible extension of the principally used vestibules; replacing the glass block at the top of about 20 classrooms in the older section. If you go to page 2 of the report, Fairgrounds tested out at 50 pascals at .68 cubic feet per minute per sq. foot.

Alderman McCarthy

Can you translate that into English?

Mr. Gaston

That represents infiltration. We've forced infiltration through this test and depressurizing the building and measuring the pressure difference.

Alderman McCarthy

So we take the building and seal it up. And what we see is leakage of .68 cubic feet per sq. ft. of floor area?

Mr. Henry

No, shell area... walls and roofs... exterior.

Alderman McCarthy

That's a lot of air.

Mr. Gaston

And it works out to 4 complete exchanges an hour in the building, if you look on page 1. So, that's a leaky building. It's not as bad as some we've seen, but it's not as good as it could be.

Alderman McCarthy

What would you expect a building built now to be when it's finished? Built with typical construction... this building, for example?

Mr. Gaston

A well built building that is really paying attention to this... Merrimack Valley High School came in at .15 so less ¼ of the infiltration of your building. So those numbers are attainable if you do a super major renovation. But I think you can probably expect to get about a 50-60% reduction in infiltration. Page 7 shows leakage through the slab. This is pretty dramatic, and not a place you would normally look. So you're losing a lot of heat, not only out to the edges, but down to the earth underneath as well. There's not a lot we can do about insulating under the building, but if you do any new construction on slab, be sure you put in R30 or 40 under the slab.

Alderman McCarthy

Are there floor covering solutions?

Mr. Gaston

You get into all sorts of condensation and moisture problems with that. I wouldn't encourage you to do that. But we do have some solutions and samples to pass around. We can illustrate this and cover it with a pretty flexible and strong material. This is just one product we're looking at. We could get an R10 on that perimeter.

Alderman Tabacsko

Where does it apply?

Mr. Gaston

It's applied vertically down the foundation wall. There's digging involved. In this report you'll find recommendations with costs associated, but that doesn't mean that that's necessarily what Jordon will recommend. As in this case, we found a better alternative, which is a very durable product.

Mr. Henry

If we go back to page 7 you can see the hallway with the leakage. With our recommendation you'll still get light coming in, but you'll get significantly improved insulation. On page 8, where the roof meets the wall there's a tremendous amount of leakage. So this is a very helpful report. If you go further on page 13 you see the leakage around the doors and vestibules. If you look at the picture I handed out, there is an enormous amount of fenestration in each room... way beyond what's needed for natural lighting. So one of the things we're thinking is taking out the central section (the 3 windows in the middle) and just walling that up. That would go from about an R 1 or 2 to R30.

Alderman McCarthy

What's percentage of the translucency of the Kalwall product that's in there?

Mr. Gaston

It's probably about a 20-25% transisivity, but it's a different kind of daylight that's coming through that Kalwall.

Alderman McCarthy

If we got rid of the Kalwall product entirely and made the windows a tiny bit larger, we'd get the same amount of light that we get now, right?

Mr. Gaston

More glass, less panel.

Alderman McCarthy

What shape are the windows themselves?

Mr. Gaston

They're in fine shape... tight. This is only in 20 classrooms. Everything else is new glass windows with much less fenestration.

Mr. Henry

You're idea is an excellent one. In terms of natural lighting, you're going to get lots of it if you put in Kalwall in where the glass block is. You'd have to take a look at some of the glare issues and the orientation. I think you could explore reducing the fenestration even more, and that would make a significant gain. We'll take a look at what you can do with the whole wall and appropriate window area.

Mr. Gaston

In terms of lighting controls, one of the things we're looking at is daylight harvesting sensors. The banks of light that you have, I believe are parallel to the window wall, which is good. And if you go to glass windows you're going to have greater daylight near the window wall. But with the daylight harvesting sensors, your electric lights will dim when that happens. So we could address lighting issues with daylight sensors as well.

Mr. Hallowell

So what you described was taking out a portion and putting in a wall, essentially. Is that in one of these numbered things?

Mr. Gaston

No, that's just something we think is a good idea.

Mr. Hallowell

In most of these you have an approximate energy savings. So if I add up all the numbers in here, that's like a 45% reduction in the amount of energy?

Mr. Gaston

I wouldn't want to be held to the 45%, but you're right. By the time you look at the slab, the walls, you air seal it, insulate the parts of the roof that aren't already insulated... you've really started to reduce the load pretty significantly in the building. This is a difficult building because you have a lot of wall surface area for a comparatively small footprint. It's a one-story building with a huge slab underneath radiating heat and a roof that's radiating heat.

Mr. Hallowell

Did you do a calculation for that as to how much that would save in BTU's?

Mr. Henry

By just taking out the center panel we calculated that was almost 1,100 sq. ft. of wall that would go from about an R value of 3 to an R value of about 20 or 30.

Mr. Hallowell

Can you put that in BTU's for me?

Mr. Henry

I can't do that in my head.

Mr. Hallowell

I assume that's a big number.

Mr. Henry

Yes, We're actually entering a number of these different scenarios into energy modeling software that will take a whole building look. They're all interactive.

Alderman Teeboom

The kids spend a lot of time in these classrooms, so I hope there will be enough windows to give them enough daylight.

Mr. Henry

We're a big fan of natural lighting. And it's clear that that is a much healthier and more productive environment for students and teachers. But in these buildings, there is just so much glass that there are always shades down. So I think I pretty much covered the things on the envelope. As far as the lighting goes, we need to look at that a little more, but it looks like there's some significant savings there. We're a little unclear if there are improvements to be made on the equipment in the kitchen.

Alderman McCarthy

When did you say the report is going to be ready?

Mr. Henry

In a couple of weeks. Should we plan on coming back to your next meeting?

Alderman McCarthy

Yes. And we can expect the report on like the 11th?

Mr. Henry

Yes.

Mr. Kelley

Mr. Smith, looking at these doors on page 12 and 13... are those are the doors we talked about replacing with the access control?

Mr. Smith

We are replacing some doors, I can't say we'll be replacing these. Elm Street is one for sure, and some at New Searles and one other school.

Mr. Hallowell

So the work you're talking about doing here... would this be done concurrently with whatever heating system we put in, or is it something you would do before? Is it done in stages or all at once?

Mr. Gaston

There are a couple of these measures that really need to be done together. When you air seal the building and reduce the outflow, you get into ventilation issues. So the ERV systems should be installed at the same time that your air sealing. So you're improving the quality of the air at the same time that you're sealing. It's great for us if you do that work first because it allows us to more accurately calculate the heating equipment sizing.

Alderman McCarthy

Once we've decided which improvements we're going to make, we should sit down with Harvey at that point and go through the phasing.

Mr. Gaston

And that's something we'd like to be part of.

Mr. Dowd

Mr. Smith, as I recall this is the building I had some issues with... pipes under the foundation. Isn't that where we were having sewage problems?

Mr. Smith

Yes, we had exposed pipes on the roof, which little hands were putting multiple rocks down, which blocked sewage going out of the school.

Mr. Dowd

Is that entirely resolved?

Mr. Smith

Yes, I think we're in pretty good shape there.

Mr. Hallowell moved to adjourn. **So voted at 7:05 p.m.**

Submitted by Jacki Waters