

Mason Energy Commission Minutes

August 6, 2018

Present: Members Kathy Chapman, Liz Fletcher, Dave Morrison

Alternates Garth Fletcher, Curt Spacht, Doug Whitbeck

Guests: Margaret Dillon (energy auditor & weatherization consultant, recommended by Anne K from Eversource), Bob Bergeron, manager for new Highway Dept building project, Dave DeVincentis, electrician for new Highway Dept building project.

Meeting began at 7:00.

Margaret Dillon spoke on her work as an energy and building consultant. These minutes include her clarifications on the broad scope of information she presented. Her expertise is in designing thermal envelopes based on principles of building science and conducts whole building assessments to address all aspects of a buildings performance related to durability, comfort, indoor air quality, and energy efficiency. The goal of an energy audit is to identify energy saving measures, though not all energy audits are the same. Margaret is qualified to perform Level 1 and 2 engineering audits, the latter of which help qualify projects for utility weatherization funds and other types of loans.

Curt told Margaret that the Commission's first focus is to get the most efficient heating, lighting and insulation systems for the Highway Dept building now under construction.

Margaret had visited the site and taken photos of the steel slab and structure in place. She asked what the plan was for the wall and roof assemblies -- all the materials which cover the structure and create the thermal envelope. These materials serve as the control layers to manage water, air, vapor and heat transfer. She said that without detailed drawings, it is impossible to assess or suggest improvements.

Bob described the plan from the GC (George St John) was to roll fiberglass encased in a membrane blanket or bib over the steel rafters and purlins, then screw on the metal siding. Bob reported that they had approved an upgrade to the insulation packages for R38 at the roof and R19 on the walls. There is no plan to add interior finishes and the mechanical systems have yet to be determined, though they are considering propane fired Modines or other air-based systems for fast recovery.

Margaret expressed concern about the envelope assembly in terms of both energy conservation and managing moisture. To be effective, insulation must be in contact with an air barrier on all six sides. Encapsulating fiberglass in a bag or 'bib' can provide that air barrier until it is punctured, at which point outside air can move freely reducing its thermal performance. In addition, wherever it is attached to metal framing, it will be compressed - further reducing its performance as an insulation since fiberglass's insulating value comes from pockets of air between glass particles. This also allows for convective currents to occur as warm, lighter air rises within the blanket (batt or bib) displacing colder air which sinks to the bottom. The taller the wall, the greater the current. These dynamics are not factored in for stated R-values so fiberglass insulation R-values are overstated and it almost never performs as expected.

An even greater concern is that penetrations into the membrane will allow moisture laden air (vapor) to migrate to the cold exterior where it will condense and wet the insulation. Not only would this diminish any insulating properties, this could also result in mold growth over time as the fiberglass gathers dust and other 'food sources' for mold growth. Margaret stated that she has seen this happen in many NH steel structures - highway and fire station buildings, insulated on the interior with fiberglass batts and bibs. She has found highway garages and fire stations - buildings with high interior moisture loads – where the fiberglass insulation is literally dripping from the ceiling and walls.

Her advice was to explore the possibility of insulating on the exterior of the framing with rigid foam board. Any material in contact with the steel framing will be especially vulnerable due to thermal bridging and the high conductivity of steel, so insulating on the exterior with continuous foam keeps the framing warm and above the dew point where vapor will condense.

If insulating on the exterior isn't possible, Margaret suggested spraying 2-3" rigid close cell foam or spray foam on the inside of the steel frame before installing fiberglass. Bob Bergeron didn't think the building design allowed for increased thickness of insulation and the design calls for installing the fiberglass first. Maybe Nucor (producer of the building) has a better insulation package to replace the batts which are still on order. Dave agreed to check with Nucor.

Managing the high moisture loads of the building - due to trucks coming in with snow and ice - was discussed and she stated that if it is not possible to change the insulation strategy, they will have to rely on exhaust ventilation. When it comes to managing for any indoor contaminants, the three-step adage is "eliminate, isolate, ventilate". Since there is no way to prevent ice and snow coming in the building, drainage has been installed to remove it as quickly as possible, but ventilation with outside air will be very important to minimize driving vapor into the insulation. She suggested that Dave call Doug Waitt of Design Day Mechanicals to explore heating and ventilation options. Dave is familiar with Doug and will contact him about ventilation and heating systems, heat load calculations. 801-6000 (8.12.18 follow up note: determine the exact product material used for covering the material insulation and its vapor permeability rating. A Class 1 vapor retarder - perm rating less than 0.1 - is recommended. Any tears, rips, or penetrations should be taped and sealed immediately for the life of the product).

Since the building has large doors that will open often, Margaret recommended doors with foam cores and good gaskets to seal well. The gaskets will wear so plan for replacing every 5-6 years as necessary. She said that gas-fired condensing boilers are the most efficient heating system, though the distribution will have to be designed to allow for lower return temperatures so that condensing can happen. Radiant heat is more effective in these situations than forced hot air for base load heating, but a modine type blower helps when fast recovery is needed, like when the large doors are opened.

In Margaret's opinion, the insulation planned for the building reflects 20th century technologies and will not perform to 21st century standards and poses a moderate to high risk of failure over time due to moisture related issues.

Margaret then addressed energy efficiency for existing buildings. All buildings are unique, with their own issues and concerns, especially when it comes to moisture. But with older buildings, it is not unusual to start in the basement and address any bulk water intrusion first. Then - if appropriate - insulate and air seal. The goal is to make the basement warm and dry. Then air seal the ceiling plane and improve insulation layers as possible. Insulating walls is less important than basements and ceilings due to air infiltration and exfiltration. Margaret recommended Rich Burns of "Shakes to Shingles" as a skilled insulation contractor.

Margaret said that Eversource would pay for one or more audits. They also have funds available to pay 50% of energy saving measures which meet their cost benefit threshold. For new construction, they may be able to support installed energy efficiency measures above code. She thought that Anne Karczmarczyk, Eversource's energy efficiency program manager, hadn't asked her to do an audit because Anne was waiting to see which building the town wished to prioritize. Margaret advised that we should plan for an energy audit when it's colder, and prioritize the buildings based on the following considerations – one that: uses the most energy, has the greatest opportunities, has icicles or ice dams, or is slated for capital improvements, which can often be the most cost-effective time to upgrade the envelope. Kathy will contact Anne K. when the Commission decides which building to prioritize.

Next the electrician for the Highway Dept building, Dave DeVincentis, spoke. He strongly recommended going with LEDs for lighting, with occupancy sensors to shut off lights and save energy. Dave D. has found that dimmers don't save energy because lights are generally kept at full brightness. Garth presented a sample lighting lay-out he'd done for the highway building, based on not lighting areas above where trucks park but lighting on each side of trucks. Dave D. thought he could use Garth's information. He and Bob Bergeron and Garth then discussed lighting options.

Kathy asked how the Energy Commission could have a presence at Mason's 250th Celebration on August 25th. Margaret suggested getting information on energy saving from NH Saves website to offer to people. Also, Liz and Garth could make a poster using Garth's infrared photos to show heat losses at the Town Hall and Mann House.

Meeting adjourned at 9:05pm.