

JOINT SELECTMEN AND SCHOOL COMMITTEE MEETING

Tuesday, August 28, 2018
Estabrook Hall, Cary Memorial Building
6:00 PM

AGENDA

ITEMS FOR INDIVIDUAL CONSIDERATION

1. Review of Lexington Children's Place Heating/Cooling Systems (30 min.) 6:00 p.m.

ADJOURN

1. Anticipated Adjournment 6:30 p.m.

The next regularly scheduled meeting of the Board of Selectmen is scheduled for Wednesday, September 5, 2018 at 7:00 p.m. in the Selectmen's Meeting Room, Town Office Building, 1625 Massachusetts Avenue.

Hearing Assistance Devices Available on Request

*All agenda time and the order of items are approximate and
subject to change.*



AGENDA ITEM SUMMARY

LEXINGTON JOINT BOARD OF SELECTMEN AND SCHOOL COMMITTEE MEETING

AGENDA ITEM TITLE:

Review of Lexington Children's Place Heating/Cooling Systems (30 min.)

PRESENTER:

Mike Cronin, Director of Facilities and
Donna DiNisco, DiNisco Design

ITEM NUMBER:

I.1

SUMMARY:

The design team has found that it is not feasible to run the three separate electric heating systems (for each wing of the building) with the 150KW generator. When using the emergency generator for power, the VRF system could be set up with an alternating schedule, 20 minutes for the main office and 40 minutes for the classrooms. This will keep the classrooms at approximately 60 degrees and the main office suite above freezing (when outside temperatures are above zero degrees), but occupants could not continue to work and learn over a longer period of time. The recommendation is to supplement the VRF system with a natural gas fired element. If this is done, there would be no climate issues during a power outage.

SUGGESTED MOTION:

FOLLOW-UP:

DATE AND APPROXIMATE TIME ON AGENDA:

8/28/2018

6:00 p.m.

ATTACHMENTS:

Description	Type
☐ LCP Gas Heating	Cover Memo
☐ LCP Presentation DiNisco	Cover Memo

Memorandum

Date: 26 January 2018
REVISED 01 February 2018

From: DiNisco Design, Inc.

Reference: **Lexington Children's Place**

Subject: Gas Heating Recommendation

Based upon our meeting on Friday, January 12, 2018, it is the design team's recommendation to add a gas heating section to the ERU for situations such as a loss of power to maintain a 60° temperature while students and staff remain in the building as well as in case of extreme cold weather. New England has been experiencing increasingly extreme weather patterns as evidenced by recent cold spells which were well below Massachusetts winter design condition of 7°F.

The VRF system's heating performance decreases as outside temperature falls. The selected VRF system is capable of operating down to -13°F outside, but at that point the system rating falls to 85%, and at below -13°F manufacturers do not have published performance data.

Mitsubishi indicates that their system would run down to -18°F, but they do not have published performance data which we can base our design on. Until such published data is provided, we can only count on Mitsubishi system to work down to -13°F.

VRF system will not operate when:

1. Outside temperature falls below -13°F.
2. Outdoor unit is buried under snow.
3. System malfunctions.

The current plan in case of a power outage:

1. Gas fired emergency generator operates (150 kW).
2. ERU remains off.
3. Generator is capable of operating two out of three VRF systems.
4. The DDC system will alternate the three systems within above limitations to maintain the classrooms at around 60°F and to maintain the Administration area above freezing, down to outside temperature of about 0°F.



The recommended plan:

1. Add a gas heating section to the ERU to be used strictly for emergency conditions only.
2. The emergency conditions can be a power outage or one of the VRF systems malfunctioning.
3. Under an emergency condition, the ERU's VRF component will be de-energized, exhaust fan shut off, supply fan operates with 100% outside air and the gas furnace operates to provide heated supply air to pressurize the building. **Some ERU's may not have separate feed. In that case, the ERU would operate in 100% recirculation mode.**
4. With this emergency gas heater augmentation, classrooms will be maintained at around **65°-67°F** by VRF and the Administration area will be maintained **at about 60°F** by VRF, down to outside temperature of about -13°F.
5. Below -13°F, gas heat on the ERU can still operate to keep the building above freezing. The Administrative area receives only minimal amount of air from the ERU, so the room doors would need to be open.
6. The estimated equipment upcharge to add a gas furnace is approximately \$6,000.

Therefore, it is the design team's recommendation to proceed with adding a gas furnace to the project to be used only in emergency situations.



Lexington Children's Place

Board of Selectmen / School Committee Meeting

August 28, 2018



 **DINISCO DESIGN**
architects + planners

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Agenda

- Program Requirements
- Project Parameters
- Emergency Considerations / Resiliency



Program Requirements

- State mandated program
- LCP operates year round (with vacations)
- Appropriate learning spaces including related services
- Indoor / outdoor spaces for motor skill development
- Age appropriate facility (toilets, changing room, sinks in classrooms)
- Medical suite and support spaces
- 21st century technology
- Adequate parking
- Fully accessibility

Project Parameters

- Occupancy September 2019 (part of ES overcrowding solution)
- Provide a facility that will last 50+ years
- Provide expansion capabilities within the new facility
- Provide building expansion opportunities
- Incorporate Lexington sustainable elements as feasible
- All electric building
- Building resiliency Level 3 & 4

All electric system

- VRF System & ERU
- Appropriate for building size & spaces
- VRF equipment relatively new technology
- Energy use savings over code 51.7%
- Supported by Peer Review



Resiliency Levels

- **Level 1: Public Safety** (Police, Fire, Public Services)
No interruption of essential services;
- **Level 2: Town Shelter**
Full power necessary for public health & life safety, function occupancy, food preparation/refrigeration, lighting, internet connectivity and charging stations;
- **Level 3: Continued Operation**
Peak demand management systems during normal operation, smart load reduction in emergencies, make ready for mobile or on-site back-up/generation to carry load for continued operation;
- **Level 4 Asset Preservation:**
Provide power to hold building temperature, provide light & operate building.

Emergency Situations

- Loss of utility power
- VRF failure due to:
 - System malfunctions
 - Temperature
 - Snow

Emergency Situations

Original design was to provide gas fired emergency generator (150kW) utilizing existing gas infrastructure on-site. Considerations for this system:

- Generator capable of operating 2 of 3 VRF systems simultaneously
- ERU remains off (no fresh air provided)
- Maintains classrooms @ 60°F; administration area @ above freezing - down to exterior temperature above 0°F

Concern with original design:

- Heating performance decreases as outside temperature falls (@ ~ -13°F will not operate)
- System could malfunction (could take time for parts)
- Consideration for outdoor unit buried in snow

Emergency Situations

In order to maintain interior temperatures at $\sim 65^{\circ}$ - 67° F:

- **Option #1 (Full capacity generator, no gas heating element):**
 - Increase generator size to 300kW (from 150kW)
 - Increased cost \$125,000 for generator + \sim \$75,000 switches, etc. = **\$200,000** (direct cost)
- **Option #2 (150kW Generator with a gas heating element):**
 - Keep generator size at 150kW
 - Provide gas element to the system to be used strictly for emergency conditions
 - Increased cost **\$6,000** (direct cost)

Emergency Situation Recommendation

Recommendation - Option #2

(Small Generator with a gas element on ERU):

- Gas fired emergency generator (150kW) operates utilizing gas currently on-site
- A gas heating element attached to the system to be used strictly for emergency conditions only.
- Interior will be maintained at $\sim 65^{\circ}\text{-}67^{\circ}\text{F}$.

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Anticipated Adjournment

PRESENTER:

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