

# Royalston Historic District Commission

P.O. Box 125

Royalston, Massachusetts, 01368

Web site: <http://www.royalston-ma.gov>

E-mail: [hdc@royalston-ma.gov](mailto:hdc@royalston-ma.gov)

## Application for Certificate

### Instructions:

- Use separate applications for changes that are not related to each other.
- Include sketches or pictures showing design, sizes, colors, materials, etc. (a sketch is worth a thousand words).
- File five copies of the completed application at an HDC meeting; or mail, e-mail or give them to a commission member for filing at the next meeting.
- It is recommended that applicants attend the meeting or send an agent. Even well prepared applications generate questions and answering them quickly will avoid delays.
- Until the work is started, certificates expire if one year elapses or in case of sale. Once the work is started it must be completed diligently.
- If you have any questions, please contact the Commission.

Date: June 23, 2020

Address of Property: The Raymond School 3 Raymond Circle, Royalston, MA 01368

Owner's Name: Town of Royalston

Applicant's Name: Royalston Building Committee

Applicant's mailing address: Street/P.O. Box: PO Box 125

City, State, Royalston, MA 01368

Please check the certificate applied for:

☒ Appropriateness

☐ Non-Applicability

☐ Hardship

Short description of the proposed changes. (Provide the details on page 2 and on additional sheets and exhibits as necessary).

In order to provide a roof that is more durable and maintainable, as well as meeting a key item in the energy checklist provided by UMASS, we need to remove the chimney from this building. This will remove a structural interface between the chimney, which sits on a hard foundation, and the roof, which settles normally over time. This interface is already causing the roof to "bow" upward around the chimney. This removal will also simplify the new roof by eliminating a major source of leakage and reduce the energy loss inherent in any chimney. Once the original oil-heater boiler is removed there will be no need for a chimney. Any new energy-efficient HVAC system will not require a chimney.

*James M Barclay*

Applicant's Signature

Chair, Royalston Building Committee

### For Office Use Only

Date Filed July 16, 2020 Received by Paula Stet Application Number 2020-07-1

Date Accepted for consideration July 16, 2020 Public Hearing ☒ Notices mailing date(s) July 23, 20

Continuation date \_\_\_\_\_ Applicant's signature \_\_\_\_\_ Date \_\_\_\_\_

Decision Approved Chairperson's signature Pete J. Francis Date 10/3/20

Comments or conditions:

## Detailed description

For a variety of reasons, including the COVID-19 pandemic, the Raymond School is the only viable building for town offices in Royalston. If the town wants to use its Green Community funds to renovate and upgrade the building, it has to make the building as energy efficient as possible.

Jim Barclay, the Chair of the Building Committee, contacted the UMASS Building and Construction Technology Department. He has been working with a professor there who is also responsible for the UMASS Extension Program in building energy.

His discussions with UMASS have been how to provide a building that can have heating and cooling and be energy efficient. A primary motivation behind some of the discussion was to make this building sufficiently energy efficient that it would be an obvious choice for the use of Green Community funding both now and going forward.

Because the asbestos roof shingles on the Raymond School are being removed and a new roof installed it is imperative that we remove the brick chimney before the new roof is installed. The non-functioning chimney will be a major heat loss to the building and a source of damage to the new roof. When the chimney is removed it will allow the attic to be insulated and isolated from the heated parts of the building, which will add to the overall energy efficiency of the Raymond School.



# Chimney at Raymond School

The town of Royalston takes its responsibility for the preservation and protection of its historic buildings seriously. The work currently being done on Raymond School is an example of this commitment. As we work to convert the building into usable office space, the town is making every effort to preserve and protect the structural integrity of the building while planning for maximum energy efficiency. To this end, the town is asking for the Historic District Commission's permission to remove the chimney at Raymond School.

The chimney was part of the oil-fired heating system. Because the old furnace will be replaced by a non-fossil fuel heating system the chimney will no longer be needed. Leaving it in place will only have a negative effect on both the energy efficiency and the structural integrity of the building.

Following are details of each issue.

**Energy Efficiency:** When not used to exhaust gases from a furnace the chimney becomes a source of heat loss by wicking heated air out of the building. It also becomes a source of moisture penetration into the building and will require periodic maintenance so that it does not cause damage to the roof and rafters. The life of the new roof will be extended if there is no chimney.

Should the chimney remain in place we would need to mitigate the heat loss by constructing an insulated box (chase) around it. A sealed and insulated box would make it far more likely that the building will be able to pass a blower door test, which is required by the building code.

However, to construct a box with enough insulation would require using polyisocyanurate insulation twelve inches thick. The box and chimney would be approximately four feet square from the attic to the basement, costing between \$4,000 to \$6,000 to build and taking up valuable floor space in the building.

**Structural Integrity:** Brick chimneys that are no longer part of a functioning heating system create a weak point in the building's envelope. The roofing, underlayment, base flashing, counterflashing, sheathing, and roof structure are all vulnerable to greater deterioration over time. This in turn increases both the cost of upkeep to the town and the damage to one of our historic buildings.

Leaving a non-functioning chimney on Raymond School creates a hardship for the town because it will increase the cost of the roofing job. It will increase the cost of insulation because we have to insulate the chimney itself and build an insulated chase. It will increase ongoing maintenance costs because it represents a "weak point" in the roofing.



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**From:** [Benjamin Weil](#)  
**Sent:** Monday, August 10, 2020 12:42 PM  
**To:** [Tom Musco](#)  
**Cc:** [Jim Barclay](#)  
**Subject:** Re: Raymond School Chimney

Hi Tom,

The following is my opinion about chimney removal for the building, based on a few photographs, some architectural drawings and a few discussions with Jim Barclay.

If the chimney is no longer going to be needed to exhaust products of combustion, it makes sense from the perspectives of energy efficiency, initial and ongoing costs, and structural durability to remove it before re-roofing.

Energy:

While it is entirely possible to plug up the chimney at it is, such that it is no longer a site of air leakage, it is simpler and easier to verify if the chimney has been removed down to the level of the ceiling. This would allow simple materials (like drywall) to be used to patch the hole and assure a continuous and contiguous air barrier at the ceiling level. Leaving the chimney in place will require more advanced air sealing, but this is entirely possible and is regularly done by weatherization companies working on buildings where chimneys do penetrate the air barrier of an attic. There is some heat loss by conduction to the attic, but encasing the chimney in 2-inches of foam board or spray foam, would do a more than adequate job of reducing this effect to a negligible level. A very energy efficient building can be made of the Raymond School regardless of whether the chimney remains. It will be easier to do if it is removed.

Initial Costs:

The cost of removing the chimney must be weighed against the cost of complex flashing required of the roofing company. While this should be within the capacity of any roofer, it is more time consuming, and can be done improperly — with catastrophic results. This usually requires the most experienced tradesperson, who usually charges more per hour than the rest of the roofing crew. In this particular location, the flashing is even more critical, since it is near a valley where water will accumulate and can overtop insufficient flashing. Moreover, with snow loads, flashing may be insufficient if snowmelt occurs on the roof, since the valley may trap water and ice even in conditions that would not be as risky, if it were not near a valley.

There is some evidence that the roof rafters may be sagging in this area, and would need to be repaired or strengthened before re-roofing can begin. This is relatively simple to do in areas where the roof structure does not have to accommodate a large penetration wider than the rafter layout (probably 16 inches on center). Building reinforcement around the chimney penetration will be more expensive, complex and time consuming. If this is not done properly, the newly flashed chimney may “pull away” from the new roof, if the roof sags due to snow load. Snow loads will be larger than the building has experienced because, up to now, it has not been insulated. Once the attic is insulated, snow will not melt as readily, so snow loads will be larger and last longer.

By contrast to skilled labor required to flash the chimney and reinforce the rafters, it is fairly simple for volunteers taking appropriate safety precautions to take the chimney down.

Operating Costs:

This mainly relates to possible maintenance costs of the roof with the chimney in place. This could include roof leaks (since the chimney is the most likely site of any roof leak). Depending on flashing material, staining and fungal growth on the shingles is more likely below the chimney than in other locations. This unevenness of roof staining might require periodic cleaning that might otherwise be avoided.

#### Durability:

The issue of roof leaks and the need for very careful flashing has been addressed above. This is the primary durability argument for removing the chimney: it removes the main vulnerability for the roof. However, again, due to the placement of the chimney in a valley, ice dams are more likely to cause a water penetration here than anywhere else. While, heat loss due to conduction through the chimney is fairly small, it is enough that it can melt snow on the roof in the right conditions (thick snow, moderately warm temperatures just below freezing). Ice dams form due to uneven heating of a roof with snow on it. Snow in contact with the roof becomes liquid and runs down to some location where it is not heated and then re-freezes as ice. This accumulates forming a dam, behind which liquid water builds up until it can be pushed up under shingles or flashing due to hydrostatic pressure. This is particularly problematic in a valley due to the concentration of snow, the small pathway for water to run down and away, and the added risk of water moving laterally under the roofing and underlayment on either side of the valley. Because the attic will be well insulated, this causes uneven heating of the roof, right near the chimney. This has not been a problem in the past due to the uninsulated attic. Ice dams can cause tens of thousands of dollars in damage, ruining interior materials, the insulation in the attic, electrical equipment, and even causing water absorption in brick and consequent spalling. The primary risk to retaining the chimney, in my opinion, stems from its likelihood of causing ice dams in the roof valley.

My lay opinion on historical aesthetics: This school would have been designed with a chimney. At the time all buildings were. It is possible that the original concept drawings might not have had one. Very often architects would envision their buildings with “clean lines” and only add a chimney, once the floor plan and the heating systems locations were decided upon. To my mind, if people did not interact with the heating systems, for example if it was a steam heating system and not a wood stove or fireplace, then the historical value from a human sense of place is reduced. In short, the chimney is really just a necessary part of an obsolete heating system. Once the heating system is gone, the building’s integrity is enhanced by only including the aspects that reflect its use and not the incidental components like the heating system. An analogy might be if the Empire State Building, during its remodeling was required to maintain the loading dock and chute originally used to load blocks of ice from New Hampshire to run its original cooling system.

I hope this opinion is useful in making a decision.

Best Wishes,

-Ben

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