March 20, 2012

Marcia Moermond
Legislative Hearing Officer/Senior Policy Analyst
City of Saint Paul

RE: Appeal for Property at 23 Isabel Street West

Dear Ms. Moermond:

I am writing in regard to the property at 23 Isabel Street West, which I understand is currently going through an appeals process with the City of Saint Paul for some of the requirements outlined in a Code Compliance Report from 10/12/2011. I was contacted by the homeowner, Kristina Beedle, to provide an opinion regarding the addition of insulation to the mass masonry walls. My qualifications to give such an opinion are that I am a licensed architect with several years of experience working with historic buildings of a similar construction.

I visited the home on March 15, 2012 to review the existing conditions with Ms. Beedle. We discussed several items, including insulating the walls and roof; treatment of existing, original windows; and the application of drywall to the interior face of the walls. The following are my recommendations for these items.

Insulation of Exterior Walls and Roof

Insulation of solid masonry walls is extremely problematic. This type of wall can store a great deal of moisture, especially when constructed of historic brick that is typically softer and more absorptive than modern brick. A high moisture content in brick can result in damage to the brick during freeze-thaw cycles. These types of walls have traditionally been able to resist this damage because heat loss from the interior aided in drying the walls out and in keeping the wall temperature above freezing. Adding insulation will prevent this. If the brick in question is not highly absorptive and/or if the wall has enough air voids to accommodate expansion from freezing, then insulating may not be a problem. However, the testing to determine this is destructive, expensive, and requires experience. It also does not entirely mitigate other risks, such as condensation and mold growth. While recent research at the national level is beginning to provide better information about testing methods and successful insulation treatments, it is still in its early stages and has not had the benefit of being proven over time.

My professional experience includes forensic investigation of a spray-foam application to a multi-wythe brick and granite mass wall within an attic space. Sources of moisture infiltration had been eliminated to the extent possible, yet there continued to be water damage to the plaster in the space below. This led to the removal of selected areas of the foam and in the majority of locations, liquid water was found on the surface of the masonry, where it had been trapped by the insulation and prevented from drying.

For these reasons, I would not recommend insulating the exterior walls at this property. I would also recommend that a vapor barrier be omitted from the exterior walls to allow drying and prevent condensation.

Insulating the attic floor or roof, however, can be very effective for older properties and does not typically have problems associated with it, as long as the vapor barrier is installed correctly. It is my understanding that the homeowner would like to finish the attic for use as a living space. In this case, the insulation will be installed between the rafters, which consist of 2x4s. This makes it harder to ventilate the underside of the roof deck to ensure that it remains cold (to prevent ice dams), but if a high R-value can be achieved to reduce heat loss as much as possible, this should be acceptable. My recommendation would be to use a closed-cell spray foam for the full depth of the rafter space, which at R-7 per inch should provide an R-value of between 21-25. If head height allows, furring strips could be added to increase the depth to achieve the building code requirement for new construction of R-30 at the roof. Ideally, the furring strips would be installed perpendicular to the rafters to reduce thermal bridging. Using closed-cell spray foam provides an inherent vapor barrier on the interior face of the insulation. If spray foam is not used, a vapor barrier should be installed on the interior face of the insulation.

Drywall Installation

The Code Compliance Report also indicates that the existing interior furring strips are not adequate to support the interior walls, which I assume means drywall. This seems counter-intuitive as they previously supported lath and plaster, which is much heavier. Admittedly, some strips are loose and need to be re-attached. However, I am not a structural engineer and am hesitant to recommend re-using these strips, although it would be my preference not to introduce new materials into the wall assembly, if possible. The existing furring strips are attached to wood strips embedded in the masonry wall. This eliminated the need to anchor into the masonry. If new furring strips are added and anchorage is into the masonry, it would probably be a good idea to use stainless steel, which would not be corroded by moisture. The furring strips should probably also be pressure treated, but the compatibility of the fasteners and chemicals used in this treatment should be verified prior to installation.

Windows

According to the homeowner, their initial plan was to recreate all the window sash to accommodate double-glazing. I would recommend retaining all the original windows unless they are deteriorated beyond repair or are a safety concern, such as the windows at floor level in the attic space. I would recommend installing new storm windows, adding new weatherstripping, and sealing any air gaps around the window perimeters. Several recent studies are showing that this approach can come very close, if not meet, the performance of new windows and has the added advantage of retaining the original old-growth wood, which is far more durable than lumber available today. It also preserves the character of these window assemblies.

I hope this information is helpful in the appeals process. If you have any questions or would like further information, please contact me.

Sincerely,

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Kristina Beedle