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July 30, 2018

Dan Werner Public Works Planning Director 1020 S. Rt 7 Middlebury, VT 05753 dwerner@townofmiddlebury.org

Re: Feasibility Study Report Middlebury Police – Control Building Re-use EV# 18276

Dear Dan:

At your request, a preliminary feasibility study was conducted to help determine if re-use of the existing control structure, located adjacent to the existing police station, was possible. This review was conducted concurrently with a conceptual architectural design prepared by Harris & Harris Consulting, Inc. This design was used as the basis for our preliminary structural review.

The following report is based on conversations with you, existing drawings for the Control and Garage buildings and field information from Harris & Harris Consulting. Our findings are preliminary and are intended to help inform the Town of Middlebury about the condition of the existing structure and if it is suitable for the proposed alterations.

Existing Control Building:

The existing structure was once used as part of the town's waste water treatment system. The original building function has since been relocated and structure has been repurposed as a police garage and storage space. Current use is limited and the space shows significant signs of deterioration.

The garage and storage portion of the building is approximately 86'x43' in plan. The 29'x43' southern end was used as storage and office space. This portion of the building has a full basement, elevated concrete floor with drop beams, CMU walls and a concrete roof with drop beams. The roof elevation is 12'-8" in this area. The remaining portion of the building was used as a garage. The garage structure has a frost wall foundation, slab-on-grade floor, CMU walls and an open web steel framed roof structure. The roof in this area is at 16'-8". The garage space currently has (3) 12'x12' bay openings. Just above the garage door openings is a continuous concrete tie beam that wraps the perimeter of the garage space.

There is evidence of water damage throughout the entire structure. The steel deck and framing had

rusted in many places. Roof drains have deteriorated over time and were letting water into the building, see Figure 1. Significant buildup of white deposits on the deck and walls were noted. At low spots on the concrete floor pools of water had accumulated. Condition of concrete in these areas could not be determined.



Figure 1: Existing Interior Framing

The CMU walls and concrete foundations looked to be generally in good condition. Some small cracking was noted but did not appear to be significant in nature. The elevated concrete floors and beams also appeared to be in good condition with no significant cracking observed.

Proposed Concept:

The current proposed layout for the space includes a southern dedicated storage area and a threebay garage, see Figure 2. Currently the openings are to be 14'x14' – taller and wider than existing openings. The larger openings will require the building height to increase by several feet. In addition to the new openings, the garage space will be increasing in plan area and will include space currently used as the building corridor. This will require relocating an existing interior CMU wall.

The existing floor hatch and stair openings are proposed to be filled in as well as windows in both storage and garage spaces. A new man door is anticipated on the northern side of the building.

Recommendations/Findings:

Based on existing conditions and the existing structural plans we feel the building can be repurposed as proposed. To achieve this goal, we recommend the following:

- The existing CMU in the garage space is to be removed down to the concrete bond beam. In addition to the CMU, the eastern portion of bond beam and exterior CMU walls are to be removed. This is required to provide room for the three larger new garage doors. East walls are to be replaced with new reinforced CMU walls and brick facade. A new bond beam around perimeter of building will be required and should be pinned to the existing concrete tie beam. If preferred, it may be possible to limit the new concrete beam to the eastern side of the building with a return on the north and south walls. A new reinforced CMU wall and brick facade is to be installed from beam to proposed parapet/roof elevation.
- The existing steel roof is to be removed and replaced. We anticipate new roof framing to include open web steel joists spanning east to west. The new trusses will be 24" deep K or LH series and will be top chord bearing. This will require the addition of embedded plates in the new CMU wall extension or concrete bond beam. Joists to be designed to accommodate framing required for new garage doors. A 1.5B steel deck will be required for both vertical and lateral capacity of roof. The deck will be fastened to supporting members with pins or screws at a spacing to be determined.
- The concrete slab-on-grade floor is to be removed and replaced. The new concrete floor is to be designed for anticipated exposure conditions (5-inch thick minimum, 4,500psi concrete strength and epoxy reinforcement) and be pitched for proper drainage. Elevations to be matched at elevated slab (old corridor space), see Figure 3.
- Infill slabs to be provided at the floor hatch and stair openings. This can be achieved by doweling in a reinforced slab with matching floor thickness. Reinforcement and spacing to be detailed for design loads.
- The southern garage interior CMU wall is to be removed, see Figure 3.
- Existing low roof over the storage space will need to be cut back to new southern interior CMU wall, see Figure 3.
- New interior reinforced CMU wall to be constructed on old southern corridor wall line. This wall is to align with the existing drop beam in elevated floor, see Figure 3. The existing concrete beam has capacity to support this new vertical load, see Figure 4.
- New interior CMU wall will now take lateral loads down to the foundation. To accommodate
 this lateral load, we recommend adding a 10' wide (min) concrete shear wall and footing in
 basement level. This would be doweled into the existing concrete beam. It might be
 desirable to have a continuous wall here to separate this area from the existing. As an
 alternate it may be preferred to transfer lateral loads through the elevated slab into the
 adjacent concrete foundation wall. This would require further analysis to determine extent
 of reinforcements required.
- Old window openings are to be filled in with masonry to match existing wall.

Please let me know if you have any questions regarding this report.

Respectfully,

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William Nourse, P.E. – Senior Project Engineer



Figure 2: Proposed Plan



Figure 3: Proposed changes at ex. corridor



Figure 4: Existing Concrete Beam at Corridor