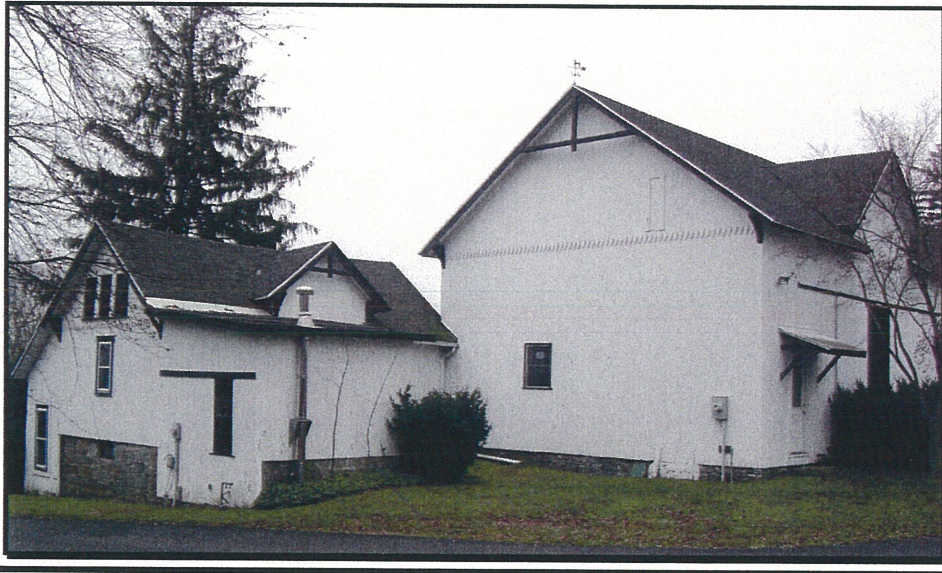


**STOWE FARM  
ARTS CENTER  
MILFORD, CT**

**STRUCTURAL  
SURVEY  
AND  
REPORT**



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## **Introduction**

At the request of TLB Architecture of Chester, CT, Gible Norden Champion Brown Consulting Engineers, Inc. (GNCB) conducted an on-site survey of the Stowe Farm barn complex in Milford, CT. The purpose was to document and assess the building's structural systems and note the present condition. This report is the summary of that survey and can serve as the starting point for the Owner and Design Team to begin the planning of this two building complex to become a public art center complex. As this represents a complete change of use of this complex, the buildings' present structural system is reviewed and comments noted to bring it up to this new useable condition following applicable Building Code requirements as well as good engineering practice.

The report is organized logically by reporting on each building; the barn, then northeast addition, and by building structural levels from roof to main floor to basement. A brief section on the buildings exterior is added to complete the survey.

The report appendices include the Photo Documentation of each structure, again by levels, a set of structural 11" x 17" drawings with structural components annotated and the preliminary structural design for the removal of the main barns center column converting the cross frames to roof trusses to give the space a completely open column free main floor space. It should be noted that this may only wish to be done in one or two bays and not the entire barn. Future space planning will determine the possible need for this large open space and its extent.

## **Main Barn**

### **Roof – Commentary**

The existing 78' x 32' barn has 6 timber framed bays of varying width to comprise the full 78' length. The shortest is about 10' – 10" and the largest some 14' x 3". It is made up of cross timber frames, generally of 7" x 7" timbers for columns and similar cross beams supporting posts at midspan up to the roof beams (purlins). These purlins are 5 ¾" square timbers and support the sloping rafters (1 ¾" x 4 ¾" @ 24" o.c) at their midspan. Refer to Appendix A and B for more details.

The roof is generally in sound structural condition as the roof appears to have been well maintained. The center column is unusual for this type of barn where generally two columns per frame were used directly under the roof purlins. These could then be framed above for hay lofts at the sides leaving the middle open.

### **Roof – Upgrades/Remediation**

The single column condition leaves the purlin stub posts unsupported thus having the cross ties act as 16' long span beams. These are not adequate to support the roof loadings of dead weight plus snow loads. Columns will need to be added below this point or the cross timbers reinforced with side members. As noted above, these frames could be converted to trusses (see drawings in Appendix B and computation in Appendix C) thereby solving this problem as well. In addition the 5 ¾" square purlins are undersized to collect the rafter loads and will need to be reinforced with a new side member or "sistered" up. A high cross tie between purlins should be added (as is present in the center bay only) to take the rafter thrust from reaching the eave beams. This will alleviate any bowing outward at the top of the walls. The rafters are adequately sized. Some timber columns are heavily spilt and require stitch-bolting to rejoin the two halves.

**Basement – Upgrade/Remediation**

The stone walls will require repointing in some areas and be coated with an interior waterproofing system of a cementitious nature. The center columns should be replaced with new steel columns and proper footings during the design of the new or remediated floor above. A new bearing wall system will be needed at the west or daylight side as the present one consists of a series of garage doors with inadequate headers and some rotting of the wall base between doors.

As the existing headroom is only about 6-8” under the joist, consideration should be given to lowering the earth floor. A new concrete slab on grade with a vapor retardant membrane below should be considered as a new floor.

In addition, further investigation will be required to investigate the east walls foundation systems to ascertain if it is a minimum of 42” below grade as required by the Building Code. Existing footing sizes and condition can be reviewed also at this time.

**Northeast Addition****Roof – Commentary**

This small, house like addition has 2” x 5” @ 26” o.c. timber rafters but lack any adequate ceiling ties. This lack of horizontal ties has caused the east wall to kick out and is currently not plumb. The low pitched shed roof to the west is undersized with only modern 2 x 6 rafters being loaded by sliding snow from the main roof. It does, however, brace the west wall top allowing the east wall to bow outward.

**Roof – Upgrade/Remediation**

The main room's rafters will require cross ties or raised ceiling joist at minimum 7'-6 above the floor. These will tie the roof in a triangulated way and take any thrust away from the top of the exterior bearing walls.

The rear shed roof will require sister rafters added alongside the existing rafters to bring them to a safe load carrying capacity.

**Main Level – Commentary**

The timber joists and carrying beams are adequate for a 40 psf residential load only. When the east wall of the existing house was removed below to provide for a 4 ft. wide addition, no new carrying beam was added to support this roof bearing wall. It has thus sagged some 3" to 4" and is quite noticeable on the Main Level. The west addition floor was completely wet during both site visit due to extensile roof leaks and will need to be more closely investigated to see if any rotting has occurred. It currently is covered completely with plywood sheathing.

**Main Level – Upgrade/Remediation**

The timber framing will need to be exposed from below and reinforced to provide adequate load carrying capacity for the new intended use. At this time, it may be feasible to jack the sagging east wall from below and provide a safe, level floor above. The west additions floor joist can be replaced if rotted or sistered up if needed to provide a safe floor for this room.

**Basement – Commentary**

The lower level has a concrete slab on grade and only the west addition or boiler room shows signs of water entry. The more modern block enclosure of this space is generally in good condition but some water entry was also present.

**Basement – Upgrade/Commentary**

Only the rear or west room which has earth around its exterior walls will require a new waterproof system applied. The granite rear walls will need some repointing and finishes will need to be removed to do this in the main room area.

Waterproofing can be applied at this time if necessary.

**Exterior****General Commentary/Upgrades**

The siding on both buildings is generally sound but some bottom boards are rotted where close to the existing grade. The wall structural systems are not modern studs with sheathing but horizontally spanning, widely spaced members called timber girts. The vertical siding is attached to these girts which are spaced from 4' to 6' apart. These are not adequately sized as they are generally 3" x 4" timbers and span completely from column to column in the barn or wall to wall in the northeast addition. It is generally understood that a new wall system will be designed to alleviate this structural problem while providing a means for insulating the walls and supporting new interior finishes. The Design Team will coordinate and plan how this important new exterior wall system will be laid out to accommodate support for environmental loads as well as provide for newly required interior and exterior finishes.