

Appendix F
STRUCTURAL ASSESSMENT REPORT
BY
ORTEGA CONSULTING



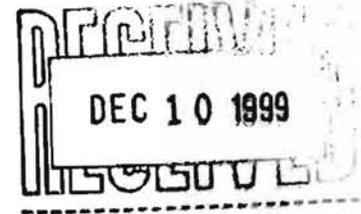
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Structural Engineering
Building Diagnostics
Architectural Conservation

Richard I. Ortega, P.E.

7 December 1999

Hunter Research, Inc.
Historical Research Consultants
120 West State Street
Trenton, NJ 08608-1185



Attn.: Damon Tvaryanas

RE: Structural Assessment, Tweeds Tavern, Valley Road/Route 7, New Castle County, DE.
Site Visits: 7 July 1999, 9 September 1999 and 8 November 1999
Delaware DOT Project 93-041-01
Ortega Consulting Project No. 99-14A

Improvements to the intersection of Valley Road and Route 7 in New Castle County, Delaware, will require the removal, demolition, or relocation of the Guthrie-Giacomelli House situated at the northwest corner of that intersection. Within the existing building was discovered the remnants of a log building known as Tweeds Tavern. Hunter Research, Inc., was engaged by the Delaware Department of Transportation to document the existing above ground and subsurface cultural artifacts at the site and prepare recommendations for their treatment. Ortega Consulting was engaged as a subconsultant to Hunter Research, Inc., to examine the condition of the extant log structure and to assess the feasibility of relocating it to a new site.

On the initial site visit we did a preliminary visual inspection of those log elements that had been exposed during earlier investigations of the building. We also identified specific areas where we needed existing finishes removed. In the subsequent site visits, after Hunter Research had exposed the underlying log structure, we did a more detailed visual survey of the structure.

The following descriptions, conclusions, and recommendations are based on approximately ten hours of visual observation conducted on three site visits. Except for the finishes noted above, we did no destructive investigation. We also did no sampling or testing of materials.

DESCRIPTION AND OBSERVATIONS

As noted above, Tweeds Tavern was discovered at the core of a larger building that had grown around the original log tavern building. The tavern was a two-story building, rectangular in plan,

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approximately 21 feet by 27 feet, with a full basement, stone foundation walls, and a gable roof. What is now the rear of the building, the west side, was apparently the principal facade with two doors in the center of the first floor with a window flanking each, and three windows on the second floor. There was a large chimney mass at the south gable flanked by windows on each floor and attic -- only the foundation of the original mass remains. The north elevation had a single door with flanking windows on the first floor, and two windows on the second floor. A large portion of the north gable wall was removed for later alterations to the building, most notably to provide a stairway.

The north half of the first-floor framing consists of large timbers, irregularly sized but roughly 8" by 8", at about 30" on center, spanning east-west, and appears to be original to the building. The floor framing on the south half is modern dimensional lumber also spanning east-west. A timber summer beam bearing on the north foundation wall and supported on intermediate posts provides interior support to the floor joists.

The second-floor framing consists of $\pm 3" \times 7\frac{1}{2}"$ joists at 24" to 27" on center spanning the full depth of the building. Most of the joists appear to be original, but they have been altered numerous times to accommodate existing and missing stairways, the missing chimney mass, and floor openings; plus, they appear to have been both raised and ripped in an effort to create a higher ceiling in the first floor.

The attic joists are the same as the second-floor joists but are still full depth. The roof framing consists of paired 3" \times 4 $\frac{3}{4}"$ rafters with no ridge board.

The walls were assembled with logs of relatively uniform dimension, trimmed flat on the vertical surfaces and with "v" notches at the corners. The spaces between the logs are relatively large and were filled with a variety of nogging including wood wedges, mortar, brick and stone; the latter was rather attractively laid on the east elevation suggesting that the wall was intended to be exposed. Cutouts in the logs indicate the original window locations. Extant window and door jambs are secured to the ends of the logs at the openings with wooden pegs. There is evidence of a variety of finishes on the walls, but the most recent appear to be plaster on furring and lath on the interior, and stucco on furring and lath on the exterior.

Except for the damage done to the historic fabric by the alterations to the building, the wood

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reassembly of every piece in its original position, tagging building part with a durable label, and photo documentation of each building assembly, with tags in place, before dismantling. The logs and other building elements can then be carefully dismantled, inspected, and stacked for shipping by ordinary conveyance, such as a flat-bed truck. At the new site the parts will be unloaded, organized according to building location and then can be re-assembled by a contractor. It should be noted that notwithstanding great care taken to save all the building parts, most, if not all, of any original finishes and nogging will be lost. The entire job, from initial documentation through completed re-assembly, can be a long process that can take several weeks, perhaps months, to complete.

Some of the factors to consider when selecting whether to move the building as a unit or in pieces include:

- The condition and construction of the building.
 - Is it strong enough to be moved as a unit? Would it be easy to disassemble and reassemble, or is it too complex? Are there valuable interior or exterior finishes that might be damaged in a move, or destroyed if the building is disassembled?
 - How many of the extant logs will need to be replaced anyway?

What remains of the log building appears to be in relatively good condition, but there are large gaps in the walls that will require stabilization if the building is to be moved as a unit. The existing exterior stucco, lath and furring appear to help compensate for the lost log units and provide some stability, so it should not be removed prior to the move. Infill structure will need to be built where the walls were removed in the northwest corner and where the chimney mass used to be in the south gable wall. It is likely that the current and former window and door openings will need to be temporarily filled prior to moving the building. In addition, the building will probably require temporary interior bracing walls and exterior cables to keep the building square and true throughout the move.

The building appears to originally have been a rather straightforward structure, but various alterations have increased the complexity of the task of identifying the various parts and recording how they fit together. As noted earlier, the building elements that remain appear to be in relatively good condition, but there are many pieces missing; whether they will be replaced will depend on the preservation plan developed for the building. The

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framing and log walls are in generally good condition. We noted little visible evidence of rot, even at the lower logs and the joist ends, which would suggest that the walls had always been covered with a protective finish.

In contrast, the numerous alterations to the building have caused extensive loss of historic building fabric. Perhaps 40%-50% of the exterior second-floor walls have been lost, and 20%-30% of the exterior first-floor walls have been lost. The losses have occurred where new windows and doors have been cut, or where existing openings have been enlarged. At the northwest corner of the building portions of both the walls were removed at both floors of the building to make room for the current stairway.

CONCLUSIONS AND RECOMMENDATIONS

As a building type, most log buildings can readily be moved, either intact or by disassembling and reassembling at a new site. To preserve its historic integrity, it is generally better to move an historic building as a unit rather than in pieces, but log cabins also are unique among building types, because they are relatively easy to disassemble and re-assemble without significant change in appearance.

Moving a building as a unit is a cumbersome project that requires specially trained contractors with special equipment. It also requires significant logistical support to coordinate the efforts of many people and agencies such as utilities, police, fire, and permitting departments. It requires time and effort to prepare the existing building for the move, to provide access to the existing and new sites, and to prepare new foundations at the new site. The condition of the building prior to the move is documented photographically. Damaged, or weak, parts of the building are structurally reinforced to ensure it will survive the move. Although these preparations, including work at the new site, can take some time (a few weeks), once they are complete, the actual move is done rather quickly -- in a day, if the new site is nearby.

Moving a log building by disassembling it can be accomplished without specialized contractors and equipment although great care must be taken to document, label, and prepare every piece of the building. This generally requires drawings of the location of every log, rafter, plate, joist, floor board, door frame, window frame, etc., including a labeling system that will insure proper

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same can be said for the historic finishes.

- The distance between present and new site.
As the length of the move increases, the cost of moving the building as a unit increases more rapidly than the cost of moving it in pieces.

It is our understanding that the Tweed's Tavern is likely to be moved to a nearby site, so moving it as a unit would be the preferred method.

- The size of the existing building.
The larger the building, the more difficult the logistics of moving it as a unit and the increases are not linear.

The tavern is a modest size building which can be moved utilizing standard equipment and methods employed by contractors who move buildings.

- The routes available to the new site.
Narrow roads, low overpasses, bridges to be crossed, and numerous overhead utilities to be dropped, or raised, mitigate against moving the building as a unit, because the cost increase significantly with each obstruction to overcome, or bypass.

If the building is moved to a nearby site, the roads in the immediate vicinity appear to be broad enough and relatively free of impediments.

- Access to either site.
Poor access to either site limits the possibility of using the heavy equipment and trucks necessary to move the building as a unit.

Access to the existing site is good; the proposed new site is unknown to this writer.

- The availability of contractors with the equipment and experience needed to move such buildings as a unit.

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Delaware, southern New Jersey and southeastern Pennsylvania have a long history of moving buildings. There are several contractors in the area with necessary experience and equipment.

The factors discussed above are related to the physical task of relocating the building, but there are extrinsic factors which also influence the feasibility, or potential success of moving the building. For example:

- If the building is disassembled, is it likely to be re-assembled? When will it be re-assembled?

If there is little likelihood of re-assembly, then do not disassemble it. If it would be a long time before re-assembly, then disassembly should not be considered, because the building parts will deteriorate rapidly if not kept in a controlled environment. Such storage costs would quickly exceed any savings from moving it in pieces.

- Is there an identified recipient for the building and a proposed use; or will it be moved to a temporary location with a final site and use to be determined in the future? How long will it be at a temporary location?

A building temporarily set up on cribbing awaiting relocation is an invitation for vandalism and rapidly deteriorates. Security costs can be significant and, of course, there is the cost of two moves instead of one. If a new site is not secured before the building has to be removed, documentation and demolition may be a more realistic plan than moving it.

- Is there a proposed use for the building? Is the use appropriate to the building?
This is similar to the issue above. Without an appropriate use for the building it may be pointless, even counterproductive, to move it. Preliminary service load analyses show that the second floor framing might perform acceptably, although more limber than current standards, for residential sleeping areas, but could not meet the greater code-mandated minimum load capacities for other public uses such as office, museum, or storage without significant, probably intrusive, reinforcement. Similarly, the roof framing is light by current standards. The first-floor framing is less problematic, because new foundations and new structural supports could be incorporated at the new site without significant

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impact on the existing appearance of the first floor.

Even a moderate load intensity use for building may not be feasible without significantly affecting the existing historic fabric, but one could conceive of the building used as, for example, a two-story library reading room with the second floor framing removed and the existing logs, including alterations, exposed for view and interpretation. This would side-step most of the building's structural limitations and still make it available to the public.

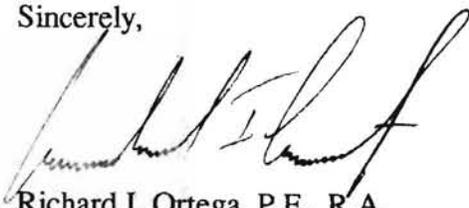
- Who will pay for the building relocation? For the documentation? For the restoration?

If DeIDOT is paying for all the costs through restoration, then relative costs of one moving method over another may not be important, but if the agency is only paying for relocation and the costs of documentation and restoration will be borne by others, then moving the building as a unit would be far more advantageous as it leaves the expensive documentation costs for the end-user. It also permits relocation of the building without dealing with restoration issues which of necessity would need to be addressed as the building was re-assembled.

In summary, it is feasible to move Tweeds Tavern to a new site as a unit, without disassembling it. Furthermore, if a recipient, a site, and an appropriate use for the building can be identified, it will likely be more advantageous to DeIDOT move it as a unit and turn it over to a new guardian, than to become involved in the downstream restoration and documentation issues concomitant with disassembling and re-assembling the building.

If you have any questions, please feel free to call me at your convenience.

Sincerely,



Richard I. Ortega, P.E., R.A.

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