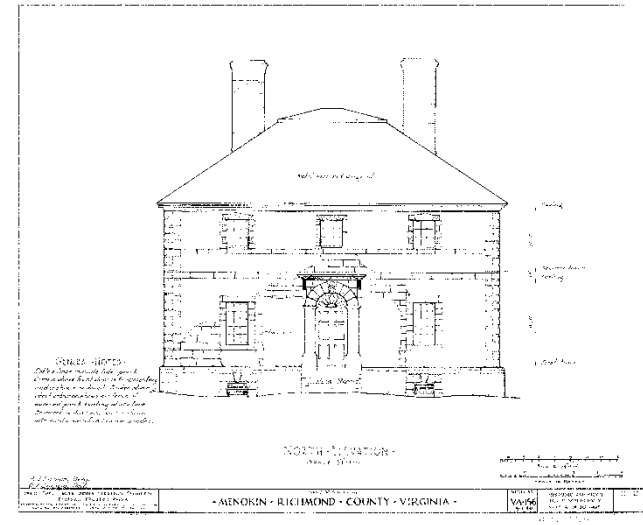

- MENOKIN - RICHMOND - COUNTY - VIRGINIA -

Since the dawn of time, man has attempted to conserve culture and display artifacts as restored objects without confusing the new and the old and taking in inside to a protected environment.

Menokin has allowed us to consider this desire and find it within our grasp.

1940

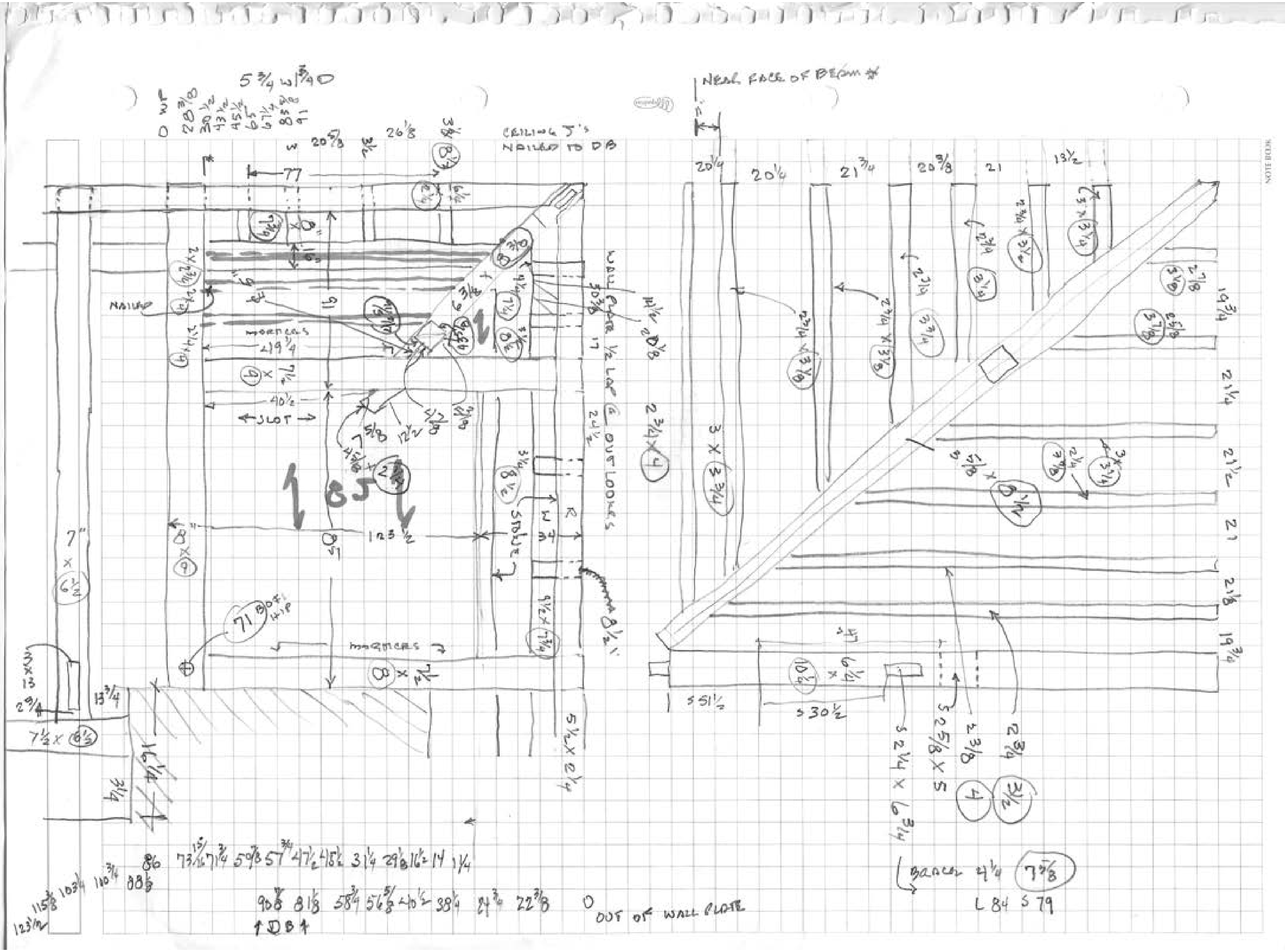
The home of Francis Lightfoot Lee, signer of the Declaration of Independence, Menokin was possibly designed by William Buckland. As such it was a good candidate for being a revered artifact.

Having fallen into disrepair and then collapse Menokin was truly in need of extraordinary intervention.

1995

Many teams had attempted to arrest the march of mother nature and the general story lead to recommending demolition and reconstruction.

John Lee and I had dealt with worse [well, worse elements, but not necessarily everything at this level]. We jumped in to stabilize and document the ruin.



NEAR FACE OF BEAM
CEILING J's NAILED TO DB
NAILED
MORTICES
SLOT
STOVE
WALL PLATE 1/2 LAP @ OUTLOOKERS
MORTICES
OUT OF WALL PLATE
DB
BRACE 4 1/4 7 5/8
L 84 S 79

Field notes for measured drawings to extablish the framing plan so than sense could be made of the collapsed members that must be removed to allow the displaced walls to be straightened and the building understood as it was conserved. Involving a crew of careful archaeologists the ruin was methodically unpacked and catalogued.


2005-58

Cut stone collection

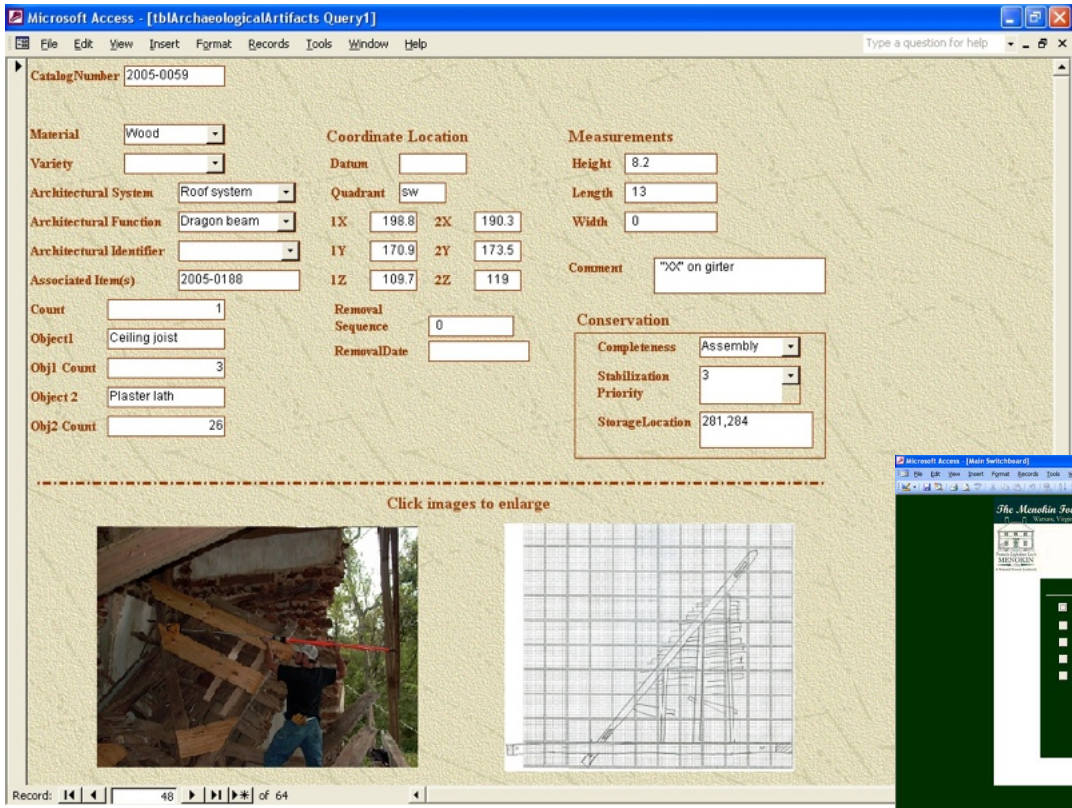
Data forms and artifact drawings

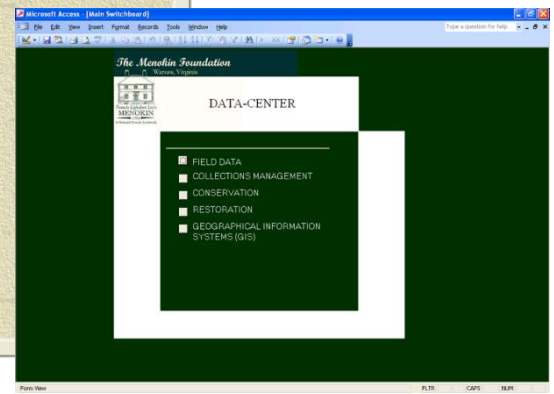
Learning Opportunities for Interns

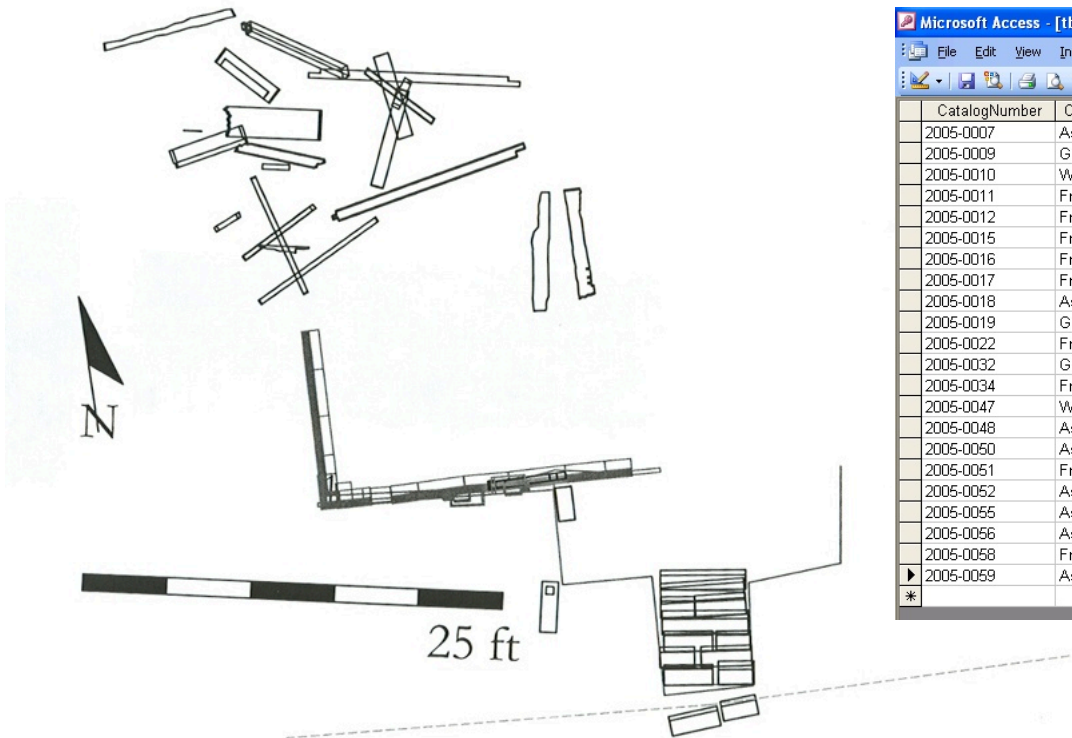
Database Development

3-D Isometric of Collapse

System Queries







Microsoft Access - [tblArchaeologicalArtifacts Query1 Query : Select Query]

File Edit View Insert Format Records Tools Window Help

Type a question for help

CatalogNumber	Completeness	Material	Architectural Function	Count	Height	Length	Width	tblConse	tblProvenience_
2005-0007	Assembly	Wood	Lath	1	6.2	9.7	0.3	6	na
2005-0009	Group	Wood	Lath	24	0	9.3	0	8	c
2005-0010	Whole	Wood	outlooker	1	1.6	0.7	0.35	9	c
2005-0011	Fragment	Wood	Indeterminate	1	6.45	0.95	0.07	10	c
2005-0012	Fragment	Wood	Rafter-roof framing	1	10	0.7	0.45	11	c
2005-0015	Fragment	Wood	Rafter	1	4.75	0.3	0.2	14	c
2005-0016	Fragment	Wood	Rafter	1	5.5	0.3	0.2	15	c
2005-0017	Fragment	Wood	Rafter	1	0.25	7.7	0.3	16	c
2005-0018	Assembly	Wood	Rafter	1	0	0	0	17	c
2005-0019	Group	Wood	outlookers	3	1.5	0.65	0.35	18	c
2005-0022	Fragment	Wood	Rafter	1	8.7	0.3	0.25	21	c
2005-0032	Group	Wood	Lath	7					c
2005-0034	Fragment	Wood	Truss chord	1	0.5	4.7	0.9	44	c
2005-0047	Whole	Wood	Dragon stud	1	4.15	0.43	0.39	60	f
2005-0048	Assembly	Wood	Lath	1	0	3.45	0.25	61	
2005-0050	Assembly	Wood	Roof sheathing	1	0.1	12.8	1.7	63	
2005-0051	Fragment	Wood	Lath	5	0.05	4.5	1	64	
2005-0052	Assembly	Wood	Rafter-hip	1	0	23.4	14	65	
2005-0055	Assembly	Wood	Roof-lath	15	0.5	8.8	8.6	67	e
2005-0056	Assembly	Wood	Roof-lath	15	0	15.5	10.2	69	
2005-0058	Fragment	Wood	Truss chord	1	0.6	5.9	0.7	71	
2005-0059	Assembly	Wood	Dragon beam	1	8.2	13	0	72	

Move to New Conservation Storage Center Begins

Wood Conservation Challenges at Menokin

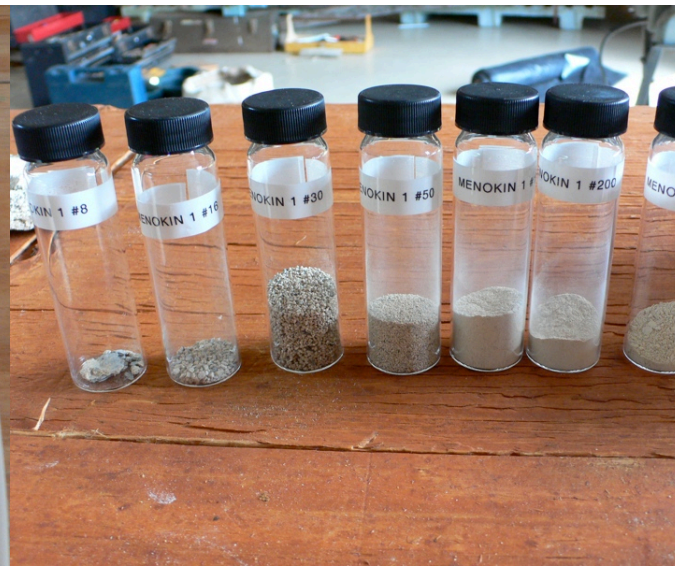
Dealing with the fallen elements was bad enough. Some of the portions still in place presented even more problems. Some like this girder could not be conserved in place and must be removed, conserved and eventually reinstalled.

Oh my …., What have we gotten ourselves into?

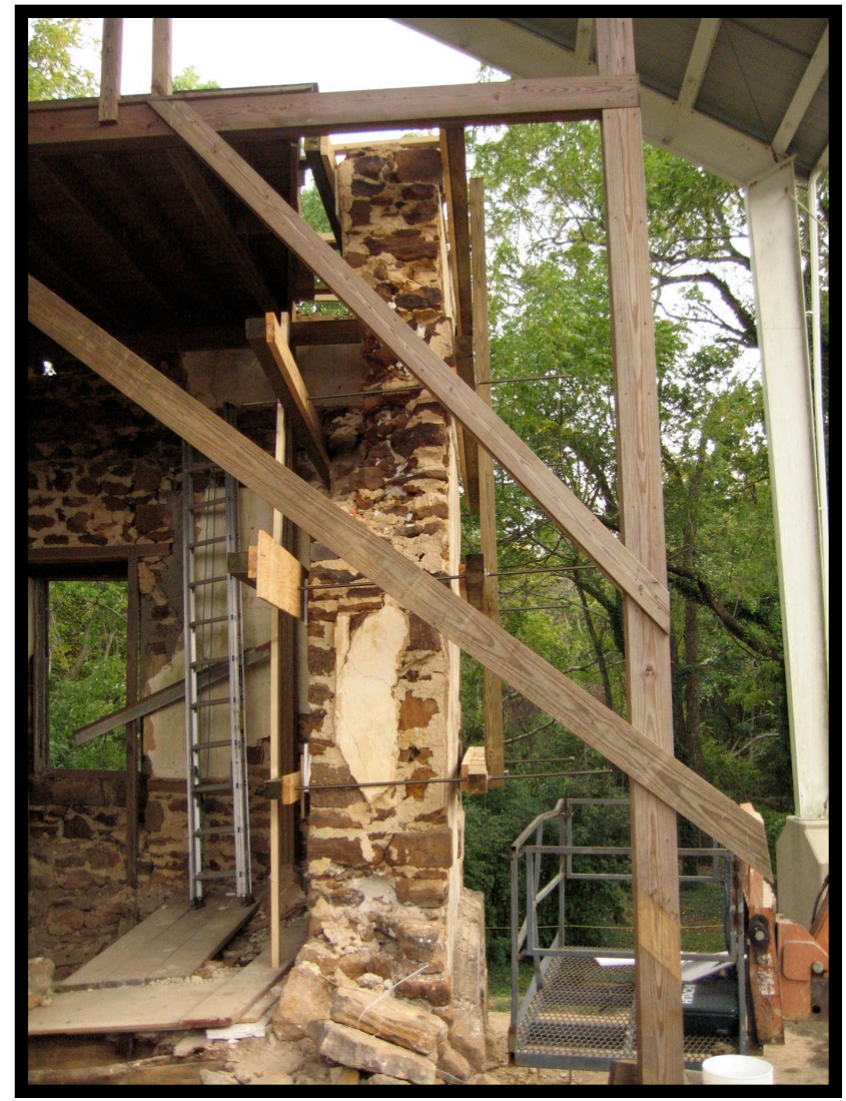
Wall Ledger Consolidated to Again Carry Weight of Joists Down Through Exterior Wall



Mortar making

Widespread grouting of voids



Strongbacks, tightened bolts, and a come-along

Strongbacks and wrenches

Bench clamps and Wooden Wedges

Cornerstone in Trouble

One week when we arrived to work we found the corner stone had gone from t pieces to a dozen.

Remnants of the stone removed
After lifting the corner on steel bars

With a little horsepower assistance

Before and After
Corner Realignment

Making a Composite Cornerstone

Grouting voids with lime mortar and reinserting the recast cornerstone. Note the rebar in the trench. This is to allow the stone to easily roll into position.


APRIL
CHARLES PHILLIPS
TERRY Hooker
GARRETT BROWN
JGLEE

The exposed concrete of the cast stone is awaiting a matching Jahn repair fill to match the adjacent fragments.

Menokin

April 17-21

Work at Menokin during the week of April 17-21 concentrated on continuing the removal of stones and rubble from the Northwest Quadrant under the direction of Jim Gibb, as well as continuing stabilization of the Northeast Quadrant under the direction of John Lee and Charles Phillips. John also tested sand sources from the site in an attempt to find a match with the sand in Menokin's lime mortar. In other areas of the ruin, Terry Hooker and Garrett Brown realigned and began stabilizing the NE corner of the building where a large foundation stone had fractured into multiple pieces, in addition to continuing the grouting of voids in the masonry and the stabilization of the lower section of central wall that was realigned last fall.

Excavation

The archaeology team worked through the week removing artifacts and rubble from the Northwest Quadrant. As of the end of this week, a total of 200 artifacts, including dressed window stone, most of the quadrant's quoin stones, and wooden window elements have been tagged, mapped, documented, and removed to pallets.

After tagging the artifacts with numbered stainless tags and stainless aircraft wire, the dimensions were measured and an electronic transit mapped three points on each object to record the artifact's three-dimensional location within the rubble pile. This data is being used to continue the spatial recreation of the collapse in AutoCad that might assist researchers in understanding the original relationship of the artifacts to one another.

This round of work on the database and 3D map includes completion of the information from the SW quadrant artifacts that was unable to be completed with given funds last year so that all data on removed elements will be up-to-date.

Next week should complete the archaeological excavation of the NW quadrant, allowing access down into the basement of the standing NE quadrant and begin erecting scaffold to work on the fragile upper sections of the NE, including the heavily deteriorated girders and wall studs currently suspended in mid-air.

Activities were additionally documented in a newsletter format.

Tasks in Order: Repairs to the East Wall

3. Re-establish contact between wallplate + masonry

4. Install wall plate to supply lateral support to 5. support the end of truss with new column supported on ledger below second floor

1. Clean debris from behind stones, allowing them to slide/rotate back into place

6. Remove temporary supports and platform.

2. Stabilize the entire edge of wall, top to bottom

8.Identify window wood (in storage) to refine dimensions and allow reinstallation of stone.

9. Lay rubble wall between windows (or something else?)

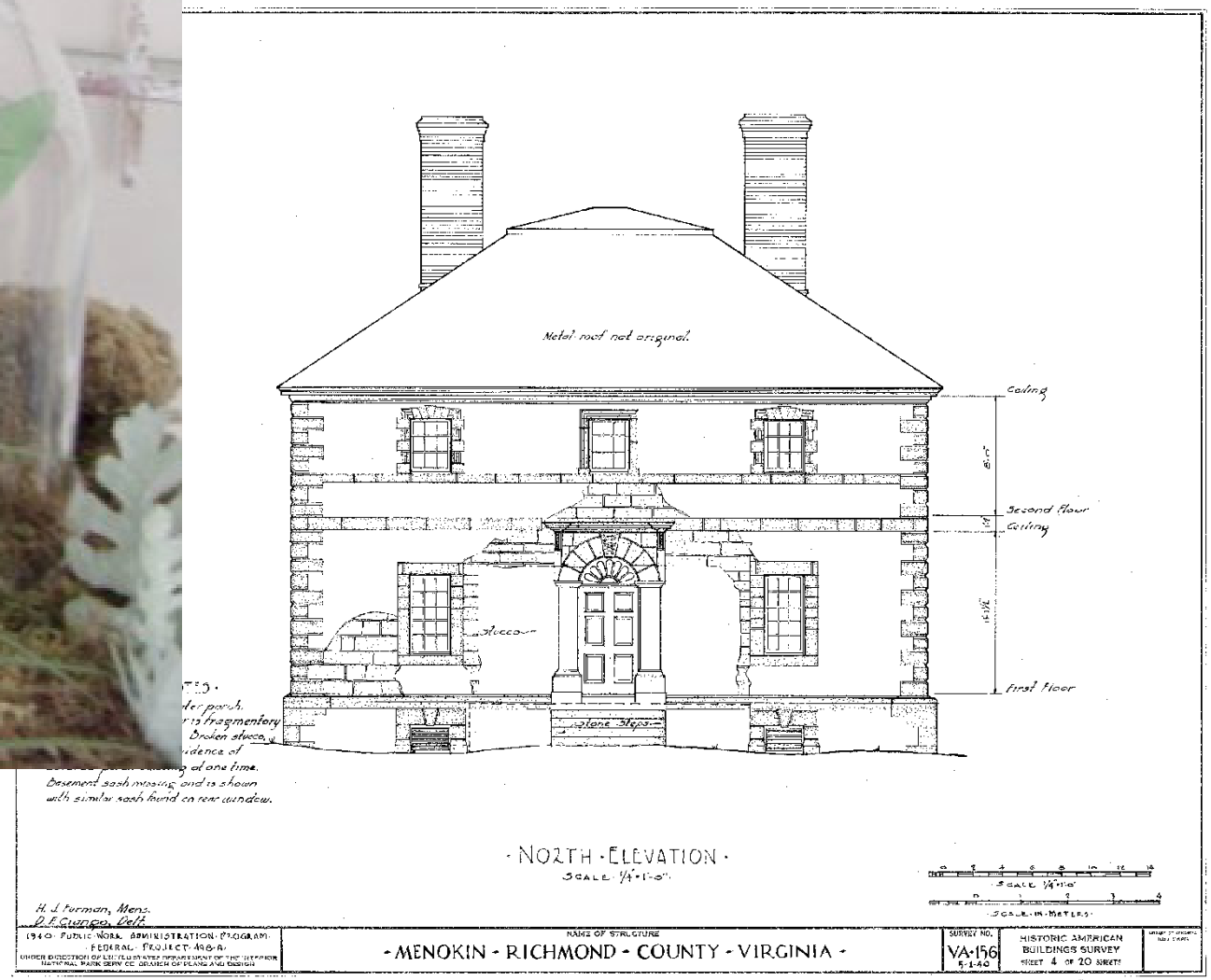
7. Move and catalogue wall fall and identify window and beltcourse stones.

Plaster stabilization injecting calcium bicarbonate followed with a high surface area calcium hydroxide to fill voids and cracks.

Other areas were temporarily stabilized with a matrix of wood strips and styrofoam padding.

But as fast as we could move, the ruin was decaying faster. Even the overstructure that had been installed by one of the early teams turned out to be a problem. Who would have thought, but a light breeze with the rain [usual condition] and the rain would wet everything below the canopy. Then the sun would come out and the canopy would shade the damp remains, growing things that would not grow in the adjacent forest.

We needed to control the environment, but how?



...der porch.
...r is fragmentary
Broken stucco,
...idence of
...basement sash missing and is shown
with similar sash found on rear window.

· NORTH · ELEVATION ·
SCALE 1/4"-1'-0"

SCALE 1/4"-1'-0"
SCALE IN METERS

H. J. Furman, Mens.
D. F. Cuenca, Delt.

1940 PUBLIC WORKS ADMINISTRATION PROGRAM
FEDERAL PROJECT A-1-8-A
UNDER DIRECTION OF DIVISION OF DESIGN, NATIONAL PARK SERVICE, DEPARTMENT OF THE INTERIOR

NAME OF STRUCTURE
· MENOKIN · RICHMOND · COUNTY · VIRGINIA ·

SURVEY NO.
VA-156
5-1-40

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 4 OF 20 SHEETS

Checking with the engineers who designed the canopy, they blanched at the idea of walls or hanging any protection from the roof. They indicated that there was no excess capacity there and we were not authorized to even hang a banner from the roof.

So we were looking at ground supported walls. That said, where do you put them. The canopy was universally reviled as an ugly blight. The site as well as the ruin were to be interpreted. The further outside the walls of the ruin the protective walls were located the more they would disrupt the site.

If the walls are too close to the ruin, one cannot stand within and step back and comprehend the artifact. As this was being contemplated the realization dawned that if the walls were glass and were located exactly where the walls were missing they would not be in the way and could actually assist in interpreting the missing portions of the ruin. As that was sinking-in, other added benefits came to mind. Even to the extent of reinstalling the surviving interiors and the conserved timbers that had been excavated.

Every time I went to a meeting of the School of Architecture Foundation at The University of Texas, I would walk past the Harry Ransom Center – a major archive– and see the glass walls with vignettes of the fantastic collections within. I thought it was a terrific use of the medium to interpret the use and contents of the building without the need of any signage. I longed to have the opportunity to do something as wonderful.

I had also seen images of the Byzantine Chapel at the Menil Collection in Houston where the spatial volume was created with frosted glass to properly display frescoed ceilings. Those spaces seemed obvious, how else could one have done it, which is one of the highest compliments one can bestow on a building.


©Paul Warchol

Then seeing the Apple Cube on 5th Ave. in NYC, I knew we could do what seemed obvious. Inclose the ruin, incorporating the standing portions into the glass walls.
I had done exhibits of fragile “ruin” evidence within glass enclosures in several places like The International Masonry Institute Headquarters in the Brice House in Annapolis with Stanley Tigerman, but this was an order of magnitude greater and would be outside.


XEROX

paragon

architectural products, llc

SWITCHABLE PRIVACY GLASS

PARAGON: SWITCHABEL PRIVACY GLASS is a high-tech privacy glass. At the flip of a switch, the electrified glass will go from a transparent to a frosted/translucent state.

USES. Ideal for conference rooms, entertainment venues, high-end residences, home offices, spas, hospitals, display screens and any situation where privacy is not needed or desired at all times. It also acts as an outstanding projection screen for storefronts and the entertainment industry.

SIZE. Our standard maximum size is 38 5/8 x 96"; however, we regularly produce larger laminates, sometimes with multiple units of privacy films within the laminate. In these cases the electrified switchable interlayer is separated by a 1/16" gap between the two pieces of film. This area can either be left clear at all times or can be covered by an etched finish; creating a small stripe.

HIGHLIGHTED FEATURES.

- Provides privacy at the flip of a switch.
- On mode - Transparent; Off mode - Translucent
- Operating Voltage: 110 - 220VAC
- Response Time: Less than 1 second
- Transmittance: On - approx. 75%; Off - 4%
- Haze: On - approx. 2%; Off - 80%
- UV Blocking: 98%
- Know for highest optical clarity available and highest level of service.

SUCCESSFUL DURABILITY TESTING PERFORMED INCLUDES.

- Switching: On/Off 3 million times at 220VAC
- Temperature: 70C for 14 days, -20C for 14 days

10680 EAST DESERT COVE SCOTTSDALE, AZ 85259 U.S.A.
480-767-8266 Fax 480-767-8267 www.glassengineer.com

I had also seen laminated glass with LED's providing a shift from transparent to opaque with a range of colors – It was not much of a jump to OLED's with moving images.

Obviously we needed a team with folks that knew this world as well as John and I knew conservation. Ellen Hagsten our co-conservator researched the question and noted that Tim Macfarlane engineer for the Apple Cube was speaking the next month at the Corning Glass Annual Glass conference and every exciting use of structural glass seemed to have Tim's name on it.

Dewhurst Macfarlane and Partners

CONSULTING STRUCTURAL AND FAÇADE ENGINEERS

Swiss Bank Cone

Stamford, Connecticut

USA

Brian Clarke's Studio

Completion 1999

Tension Net Stair

Chicago, Illinois, USA

James Carpenter Design Associates Inc

Completion 1995

Joseph Store

74 Sloane Avenue

London, UK

David Chipperfield Architects

Completion 1998

Arab Urban Development Institute

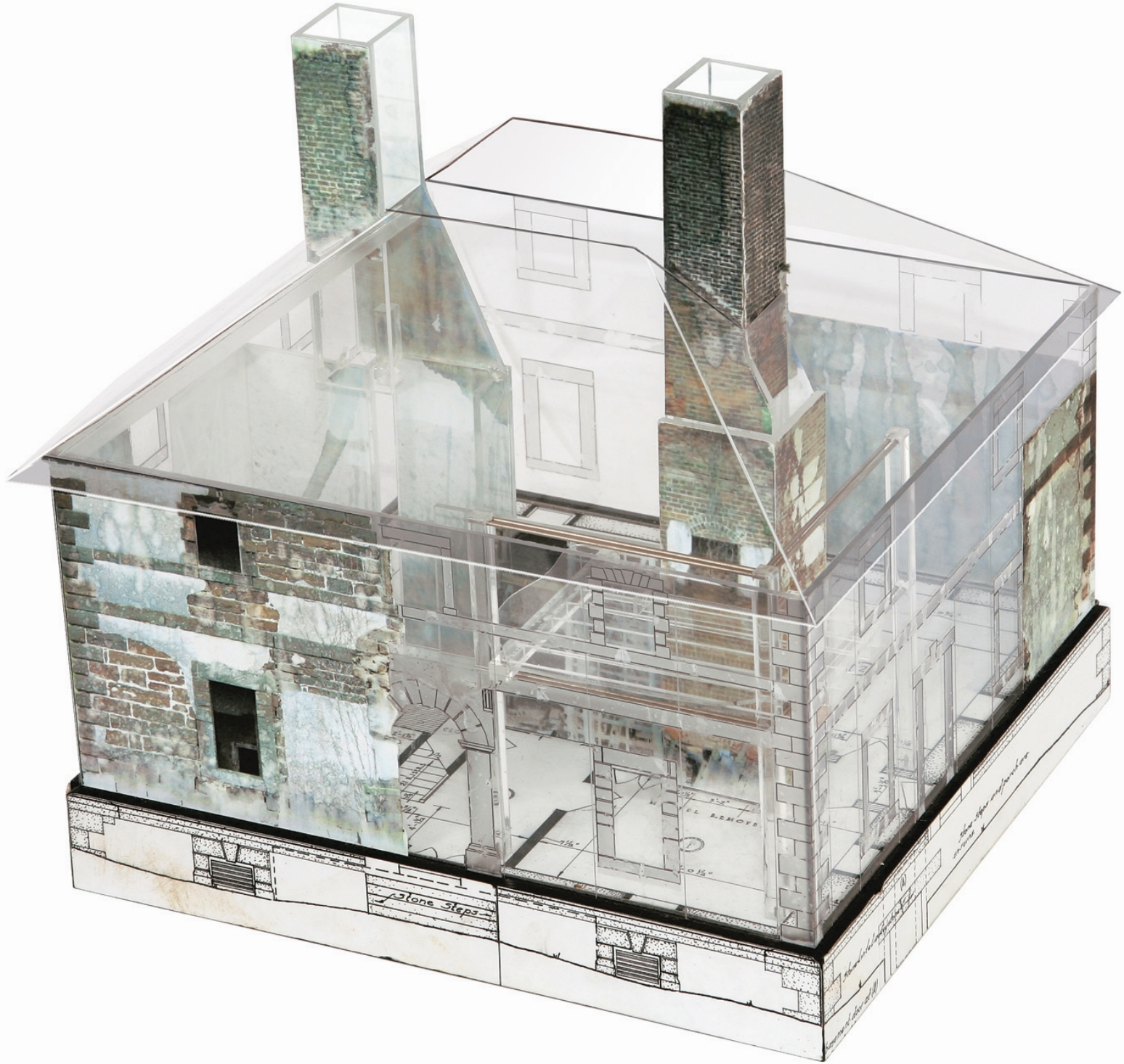
Glass Reading Room

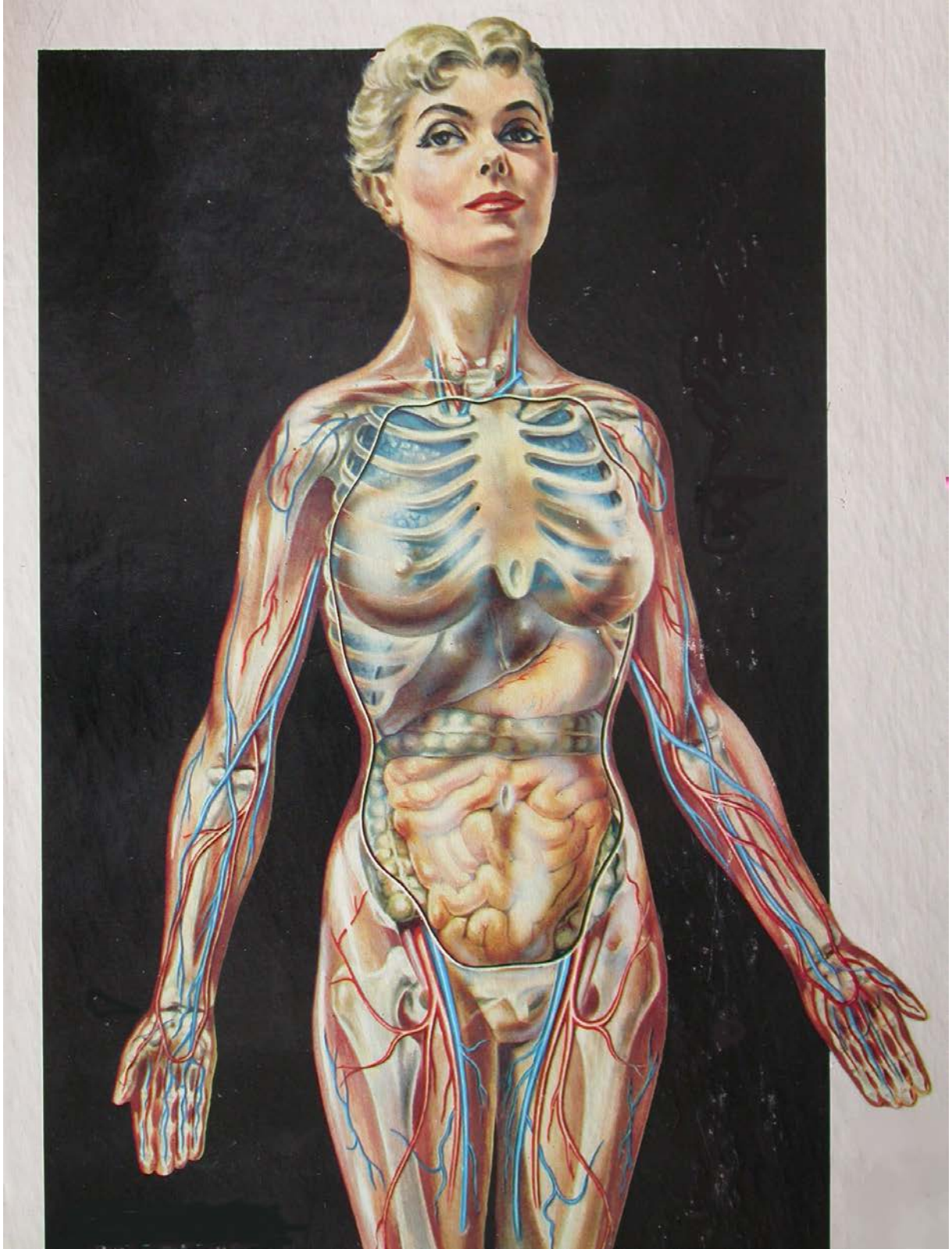
Riyadh, Saudi Arabia

Nabil Fanous Architects

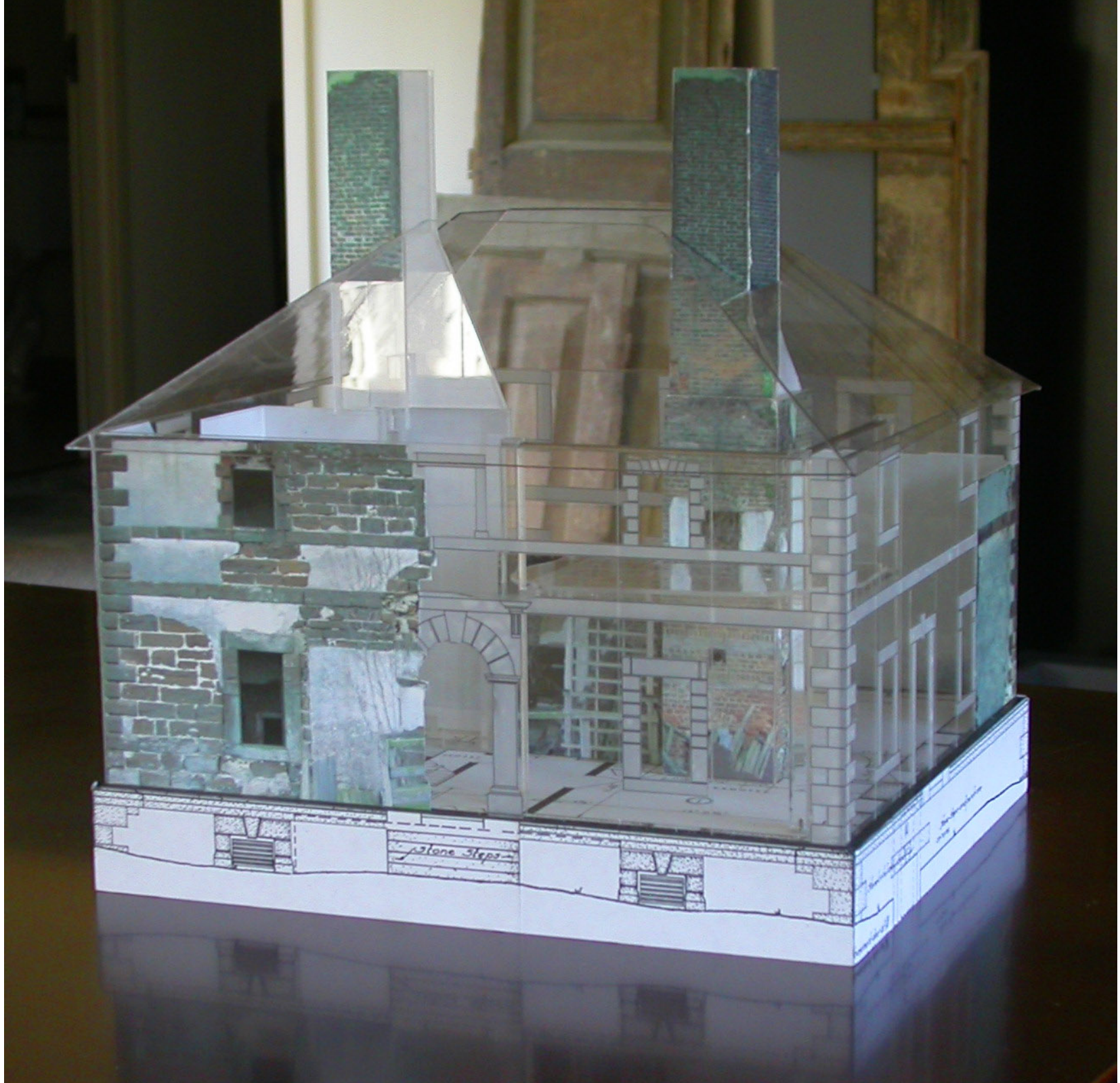
Completion 1998

We signed up for the conference and emailed Tim asking for a breakfast meeting before he spoke at noon. In the meantime we built a crude plexiglass model of what we were thinking.


Stone steps



We had the image of the Visible Woman also in mind


stone steps

Tim took one look at the model and started to point out ways to improve the design. We had never worked with someone who so immediately saw what we were trying to do, embraced it, and started carrying it forward.

Breakfast extended into an early lunch from which we walked to Tim’s lecture where he incorporated Menokin into his presentation as the next new thing in architecture.

This considering the stellar collection of designs supported by Dewhurst Macfarlante and Partners was stunning.

Dewhurst Macfarlane and Partners

CONSULTING STRUCTURAL AND FAÇADE ENGINEERS

Apple Computers
Flagship Store
Osaka, Japan

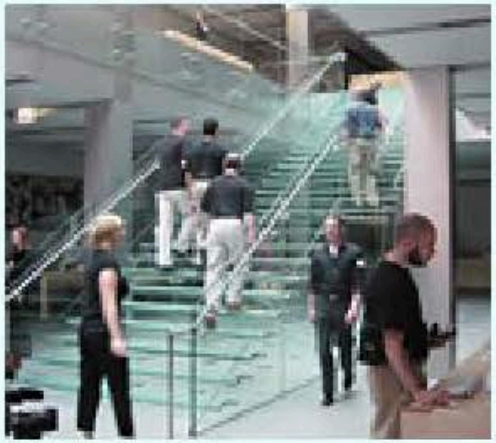
Bohlin Cywinski Jackson
Architects
Completion 2003

Apple Computers
Flagship Store
New York, USA

Bohlin Cywinski Jackson
Architects
Completion 2002

Apple Computers
Flagship Store
Los Angeles, USA

Bohlin Cywinski Jackson
Architects
Completion 2002



Apple Computers
Flagship Store
Chicago, USA

Bohlin Cywinski Jackson
Architects
Completion 2002

We got Tim on site as soon as could be arranged with his busy schedule. He presented several of his applicable projects to the Menokin Board and we were off and running.

Dewhurst Macfarlane and Partners PC

Dewhurst Macfarlane and Partners PC

profile 1412

ROYAL BOTANIC GARDENS, KEW
ALPINE HOUSE

Date
2003 Present

Architect
Wilkinson Eyre Architects

Project Value
£400,000

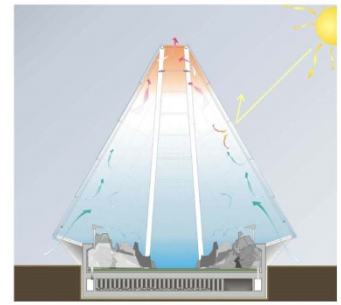
Project Status
Tender

Alpine House - Rendered view (above)

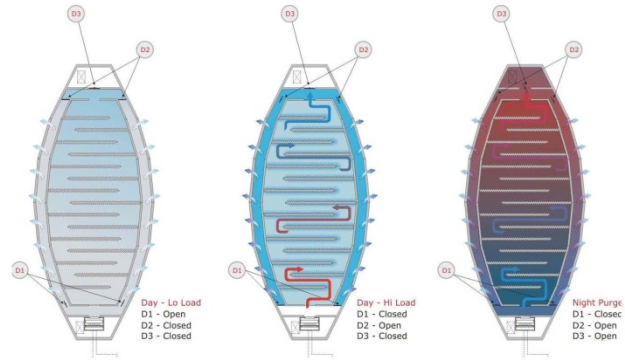
The Alpine House is a small exhibition space in Kew Gardens featuring plants local to the Alpine regions. The priority design consideration for this building is to recreate environmental conditions which match those characteristic to the alpine climate. Plenty of fresh air and natural daylight are therefore the key elements of the environmental strategy.

The skin of the Alpine House is made of low iron glass to allow for the highest possible daylight transmission. The floor slab is constructed as a concrete 'labyrinth' with a large surface area which is used to blow air through to cool the concrete down. This cooling effect is then available as a heat sink during the following day. The outlets from the labyrinth are positioned within the glasshouse and are designed to direct the air over the leaves of the plants to provide the necessary air movement.

Despite it's small size, atelier ten has simulated the temperature of the air reaching the plants in great detail to ensure that they can grow in the right conditions.



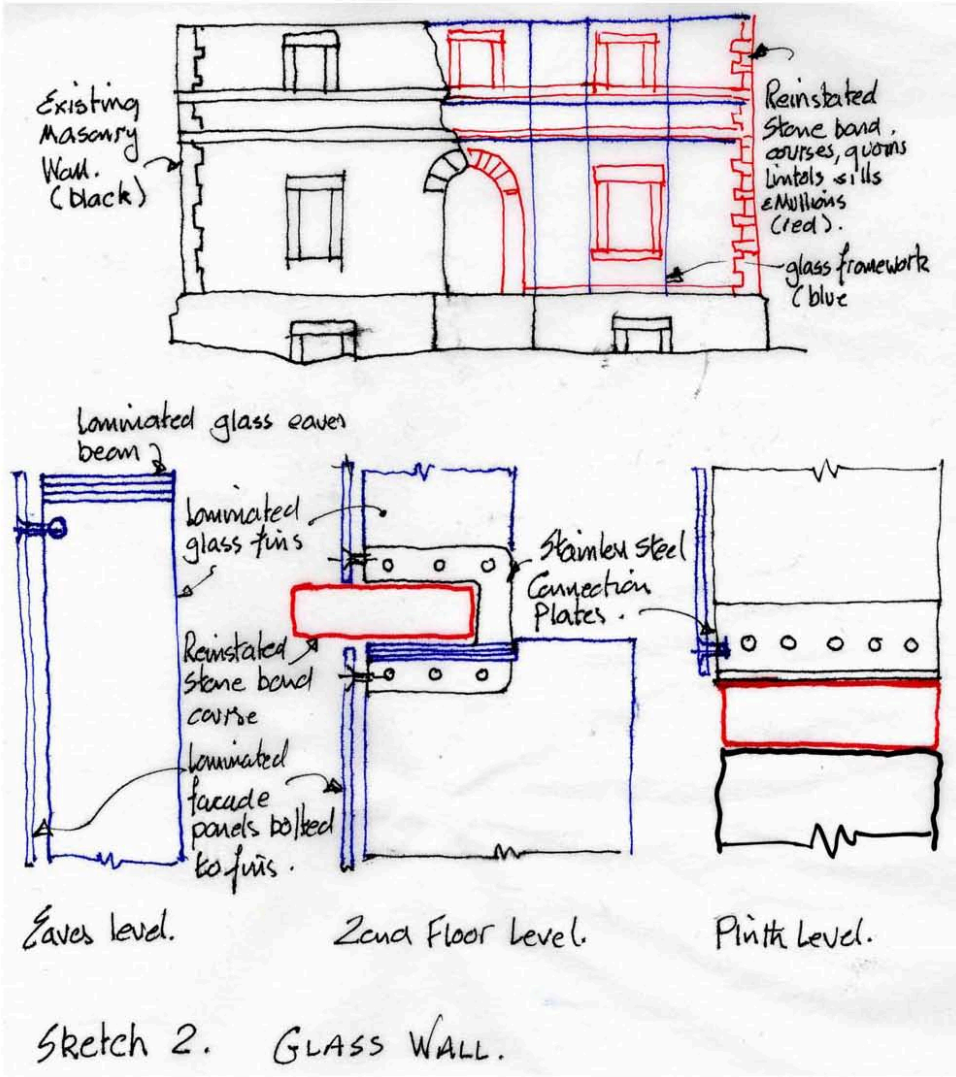
Environmental Strategy - Section through Alpine House (above) and Labyrinth working modes (below)



atelier ten

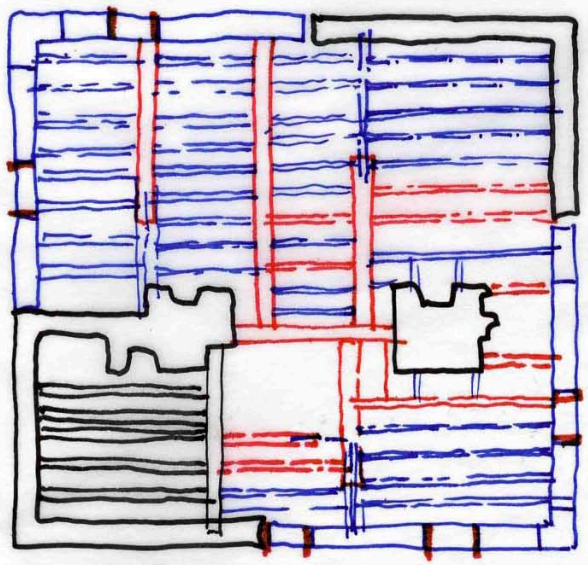
Tim brought in Atelier 10 for phase one of the feasibility study.

Tim immediately saw the opportunity to apply glass technology to the conservation of the timbers that had been excavated allowing them to be fit with a prothesis and returned to structural service.



Sketch 2. GLASS WALL.

Dewhurst Macfarlane and Partners PC



SECOND FLOOR FRAMING PLAN.
FIRST FLOOR SIMILAR.

TYPICAL GLASS TIMBER SPLICE.

SKETCH 4.

EXISTING TIMBER BEAMS & JOISTS (BLACK).
REINSTATED " " " (RED).
GLASS BEAMS & JOISTS. (BLUE).

QUEEN POSTS IDENTIFIED

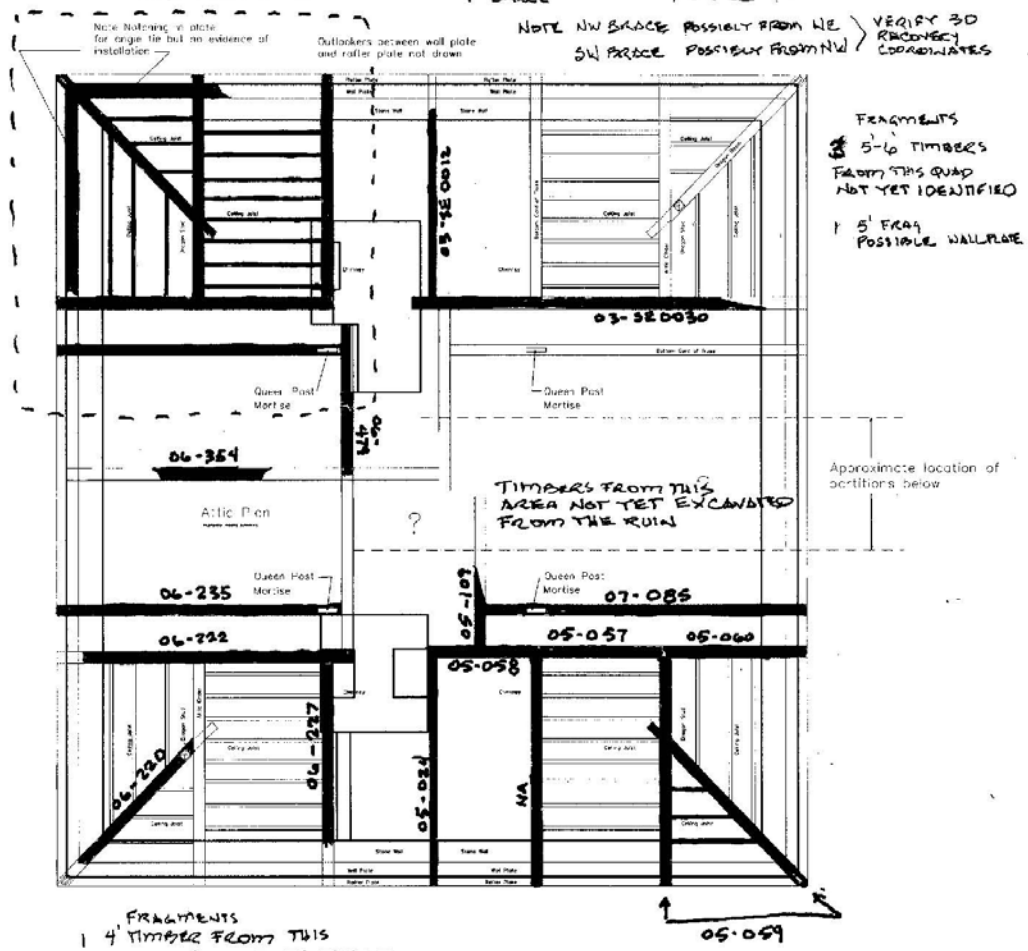
NE POST
E BRACE

SE POST BOTTOM 1'-6"
E BRACE
S BRACE

NW POST
1 BRACE

SW
1 BRACE

NOTE NW BRACE POSSIBLY FROM NE
SW BRACE POSSIBLY FROM NW
} VERIFY 3D RECOVERY COORDINATES

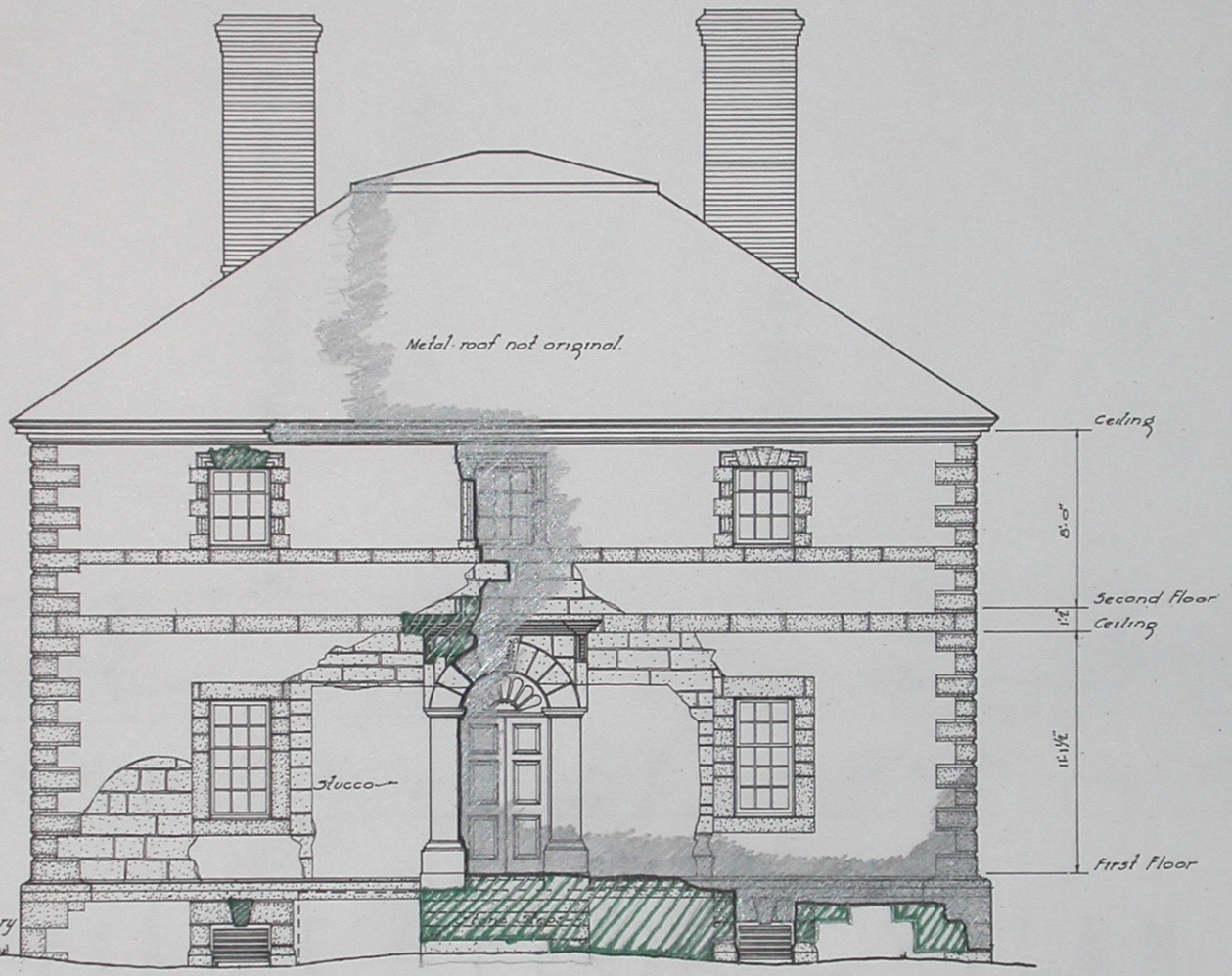


FRAGMENTS
3 5'-6" TIMBERS FROM THIS QUAD NOT YET IDENTIFIED
1 5' FRAG POSSIBLE WALLPLATE

1 FRAGMENTS 4' TIMBER FROM THIS QUAD NOT YET IDENTIFIED

CEILING JOISTS NOT PART OF N GROUP HAVE NOT BEEN INVENTORIED

INVENTORY OF ATTIC FLOOR LEVEL STRUCTURE TO DATE
14 JUN 07 CAP



· GENERAL · NOTES ·

Dotted lines indicate later porch. Cornice above front door is fragmentary and is shown restored. Broken stucco about entrance, shows evidence of covered porch existing at one time. Basement sash missing and is shown with similar sash found on rear window.

· NORTH · ELEVATION ·

· SCALE · 1/4" = 1'-0" ·

· SCALE · 1/4" = 1'-0"

· SCALE · IN · METERS ·

H. J. Furman, Mens.
D. F. Giongo, Delt.

· 1940 · PUBLIC · WORK · ADMINISTRATION · PROGRAM ·
· FEDERAL · PROJECT · 498-A ·
UNDER DIRECTION OF UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE, BRANCH OF PLANS AND DESIGN

NAME OF STRUCTURE
· MENOKIN · RICHMOND · COUNTY · VIRGINIA ·

SURVEY NO.
VA-156
5-1-40

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 4 OF 20 SHEETS

LIBRARY OF CONGRESS PRINT NUMBER

Along the way we were organizing the artifacts that came with the ruin and creating storage shelving and other fixtures to help sort and understand the pile of interior woodwork that had been carefully relocated from the Peanut Barn at Bacon's Castle.
The interior woodwork from Menokin have been removed shortly before the initial collapse and significantly shortening the story, The APVA had become custodian and returned the lot as soon as the Menokin Foundation had a storage facility for it.
It was like a great 1000 piece jigsaw puzzle.
Unfortunately only an hour into the analysis, it was apparent that we had 1200 pieces of several puzzles, only 900 of which were from Menokin.
[What else is new?]

Wood Conservation Challenges at Menokin

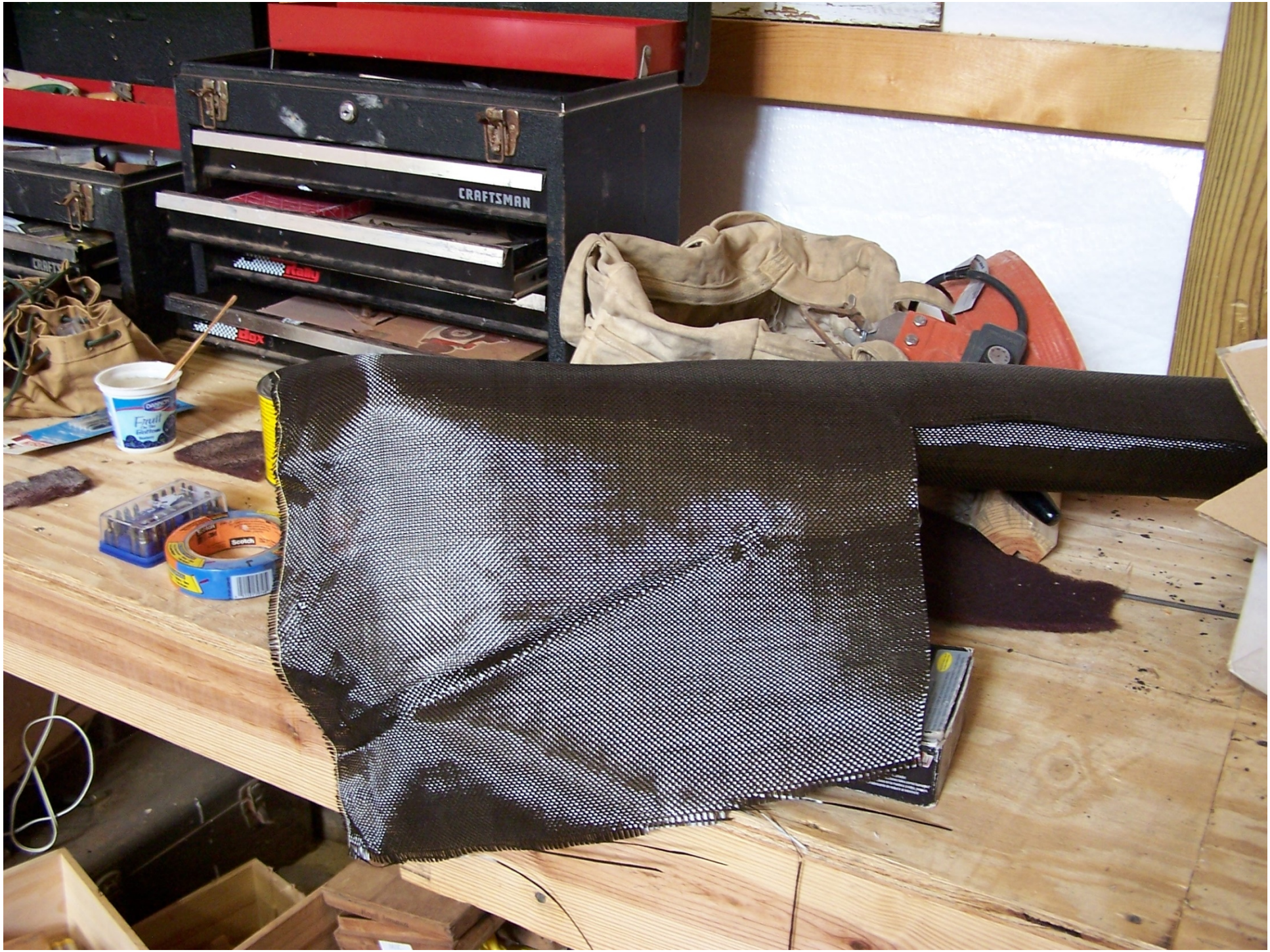
I think you can have this one. No you take it.


Xylol
Xylene

Needless to say it had to come out in several pieces.

Happily virtually all the skin was intact, but the largest pieces were badly warped.

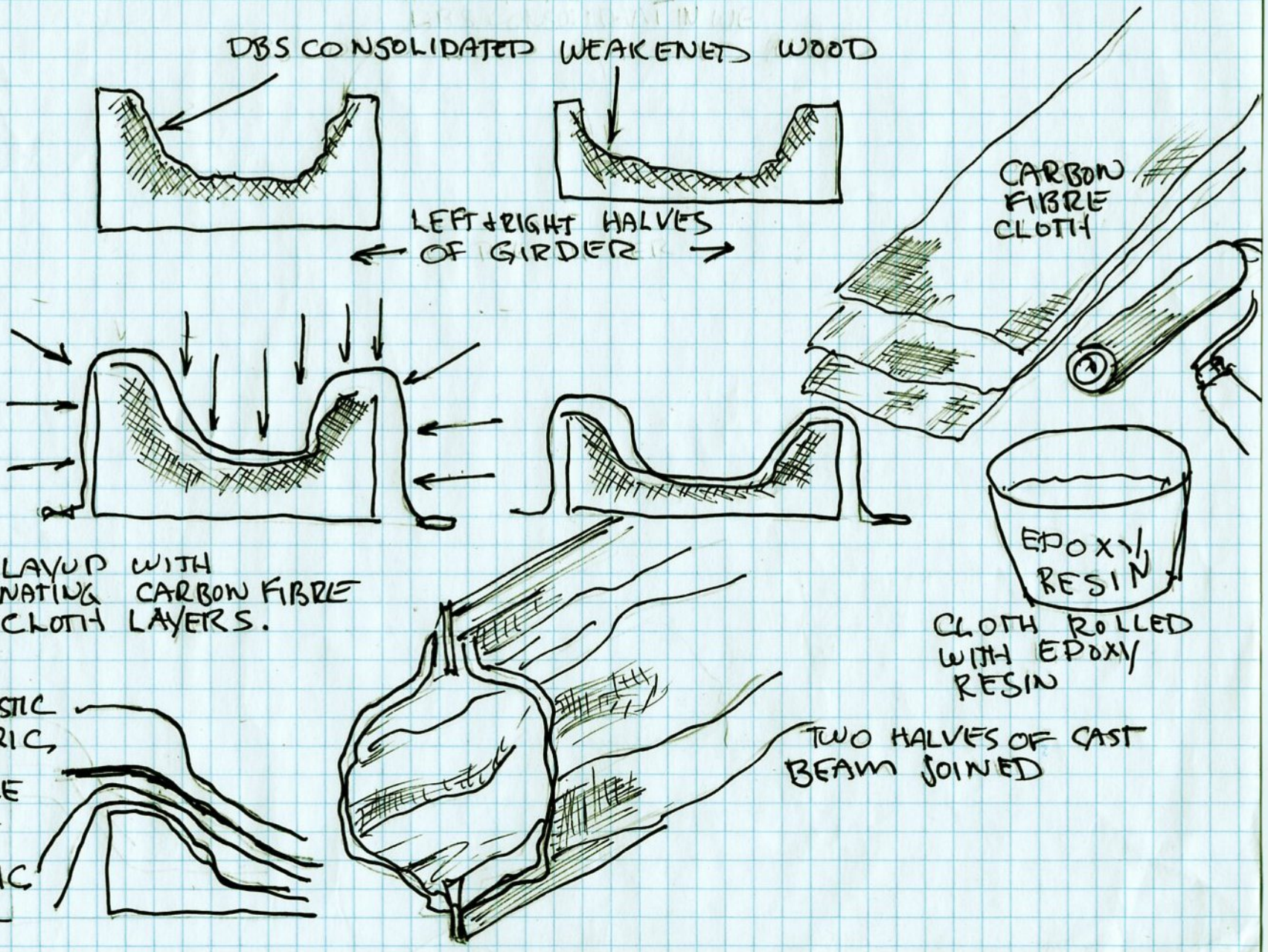
John and I decided that getting this girder back into location at full weight plus was a serious problem. If we removed rather than consolidate the internal frass and made a hollow carbon fiber core filled with foam it would be much lighter and probably stronger.
I began the process of removing the unwanted interior frass and over three days of wet work removed the three axis warpage.


CRAFTSMAN
Scotch

John in the meantime was experimenting with carbon fiber. Taking a similar timber fragment salvaged from a dumpster in Annapolis, he hollowed it out and set up a vacuum forming shop to test the concept.

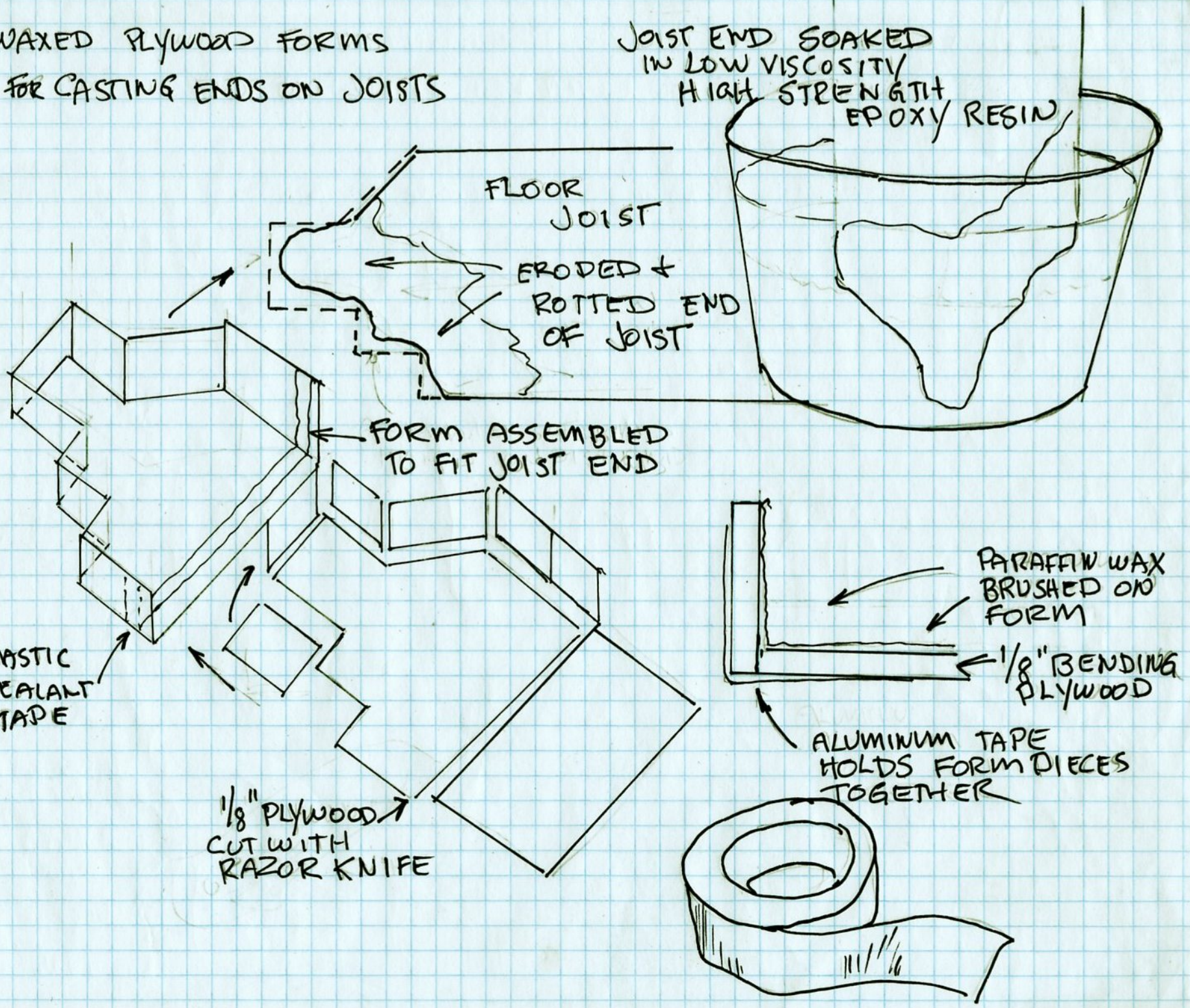
Non-Menokin test sample

SUPPORT ARMATURE FROM EPOXY/CARBON FIBRE CLOTH VACUUM FORMED TO BEAM INTERIOR



Richard Wolbers is often near at hand when we need chemical consultation and we were not happy with the available consolidants so he and John started looking at alternatives to epoxy and how carbon fiber could be used with much weaker and possibly reversible consolidants that just need to provide a measure of compression resistance.

WAXED PLYWOOD FORMS
FOR CASTING ENDS ON JOISTS



Here John is working out how to use a carbon fiber boot to complete a joist end and provide the necessary bearing points.

We needed a whole new bag of tricks and often we would decide the solution was too destructive and lacked the elegance we were looking for.


WARSAW
124 MAIN ST

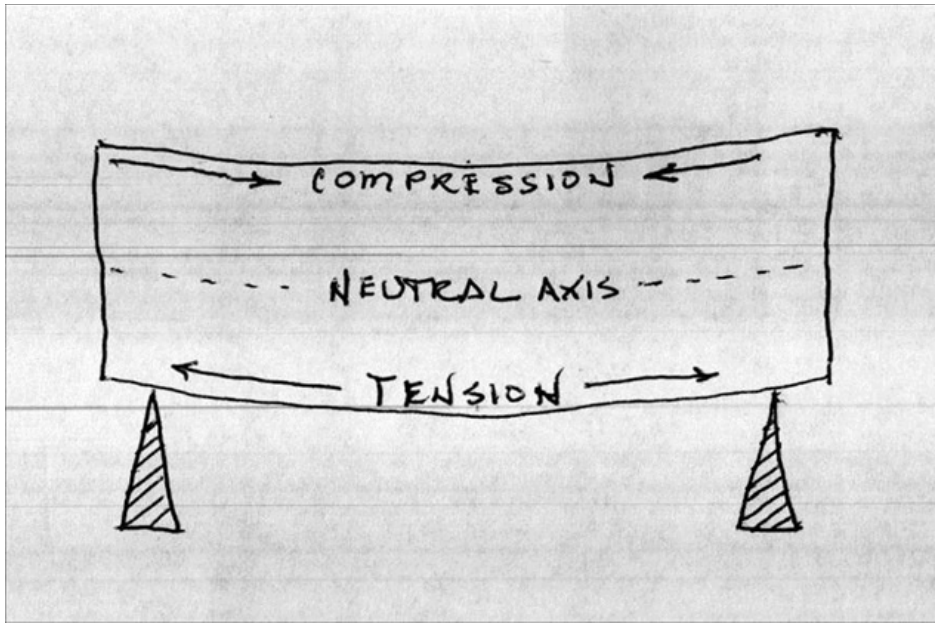

ERICANA MUSIC
ESTIVAL
24 11-6 PM

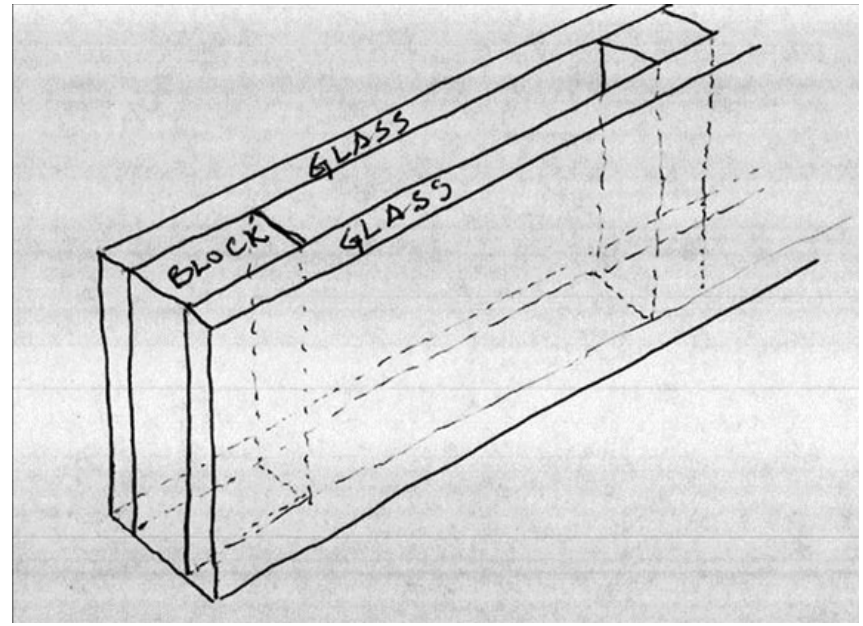
In looking at this principle rafter we decided to go back to basics.

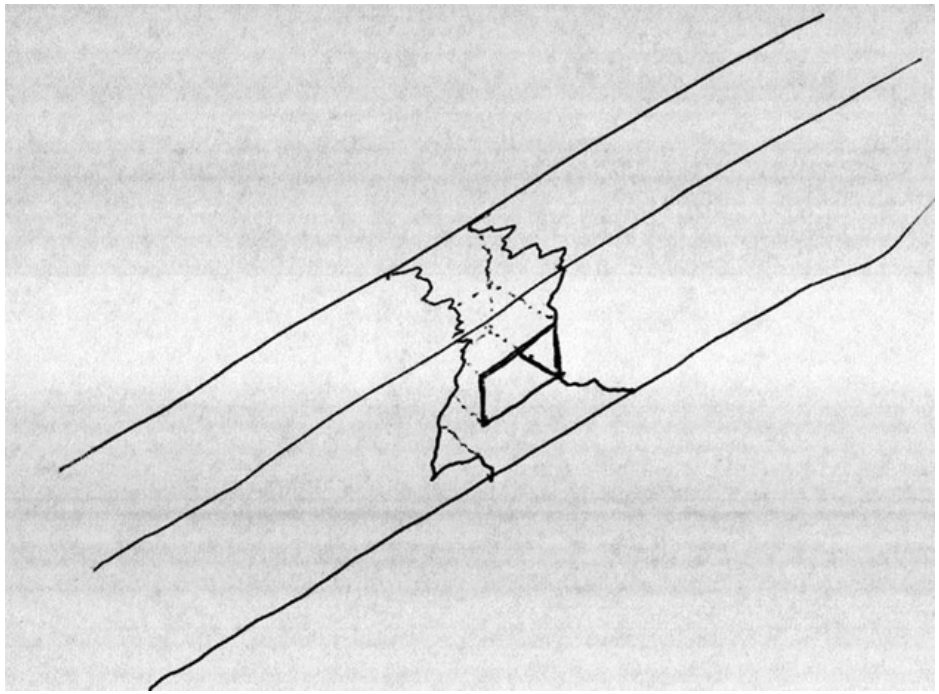
Tim got involved and we started with the understanding that beams are in compression at the top and in tension on the bottom. You don't always need to provide both at both places.

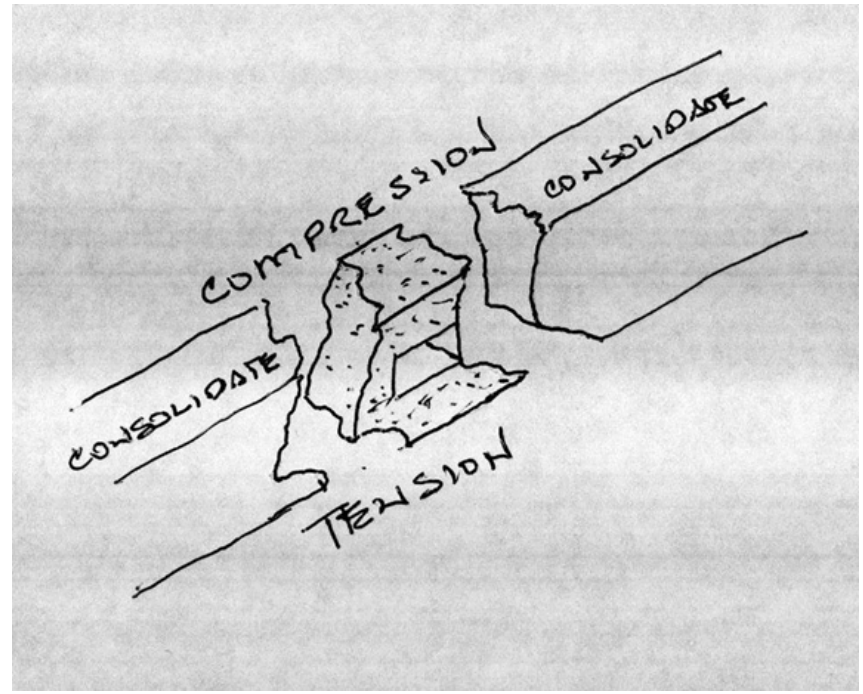
If you have a small missing component it can be loose cast and with a tension member at the bottom the elements of the beam will compress themselves together like a chinese toy.

Also laminated glass with three or more layers can have all of the layers broken and still carry the design load.


COMPRESSION
NEUTRAL AXIS
TENSION


GLASS
BLOCK
GLASS

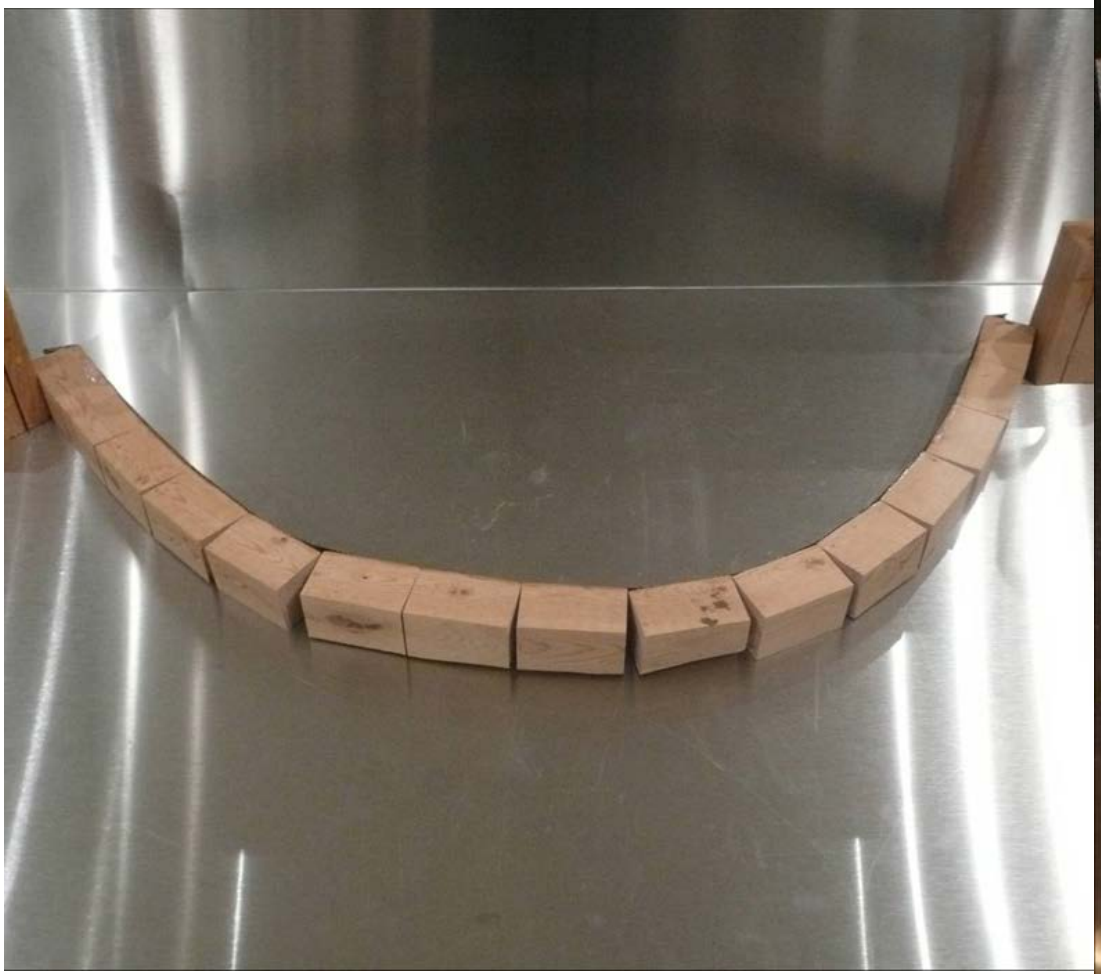


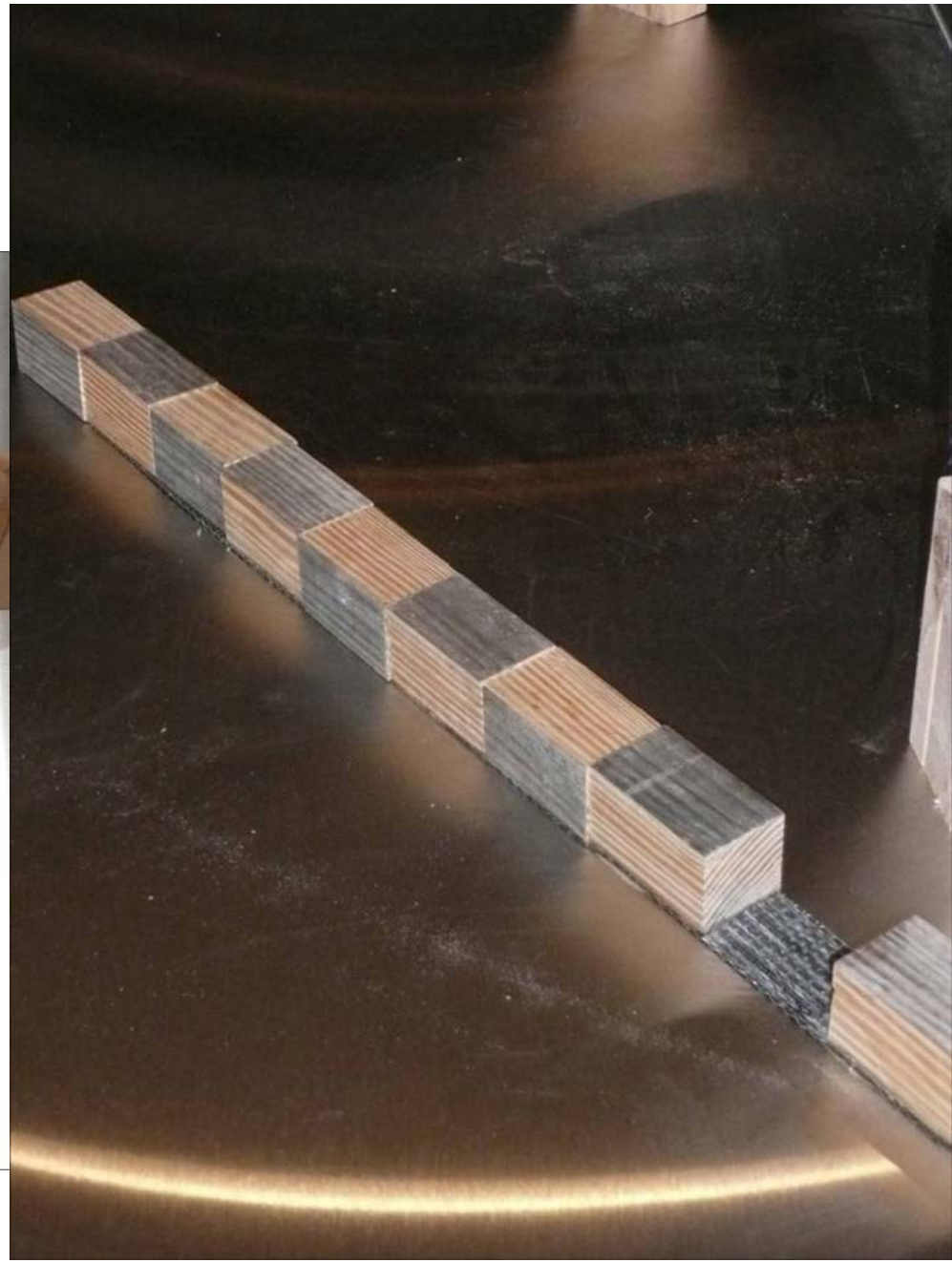

COMPRESSION
CONSOLIDATE
CONSOLIDATE
TENSION

This combined with the knowledge that in rough terms glass is 5-7 times stronger than wood in the same cross-section. It is actually close enough to steel in strength to think about how you would design it in wood or steel and then make the necessary modifications.

Thus a glass beam as tall as a wooden beam and ¼ the width of the wooden member would be slightly stronger. If you take two of them and space them apart with appropriate blocking [acrylic?] to match the same width as the wooden beam it will be twice as strong and the blocks can provide easy attachment points.

This allows a glass prosthesis or full replacement member to be made within the same dimensions of the original member.





We started a testing program for wood carbon fiber and resin composites.

The upper stick is simple wood.

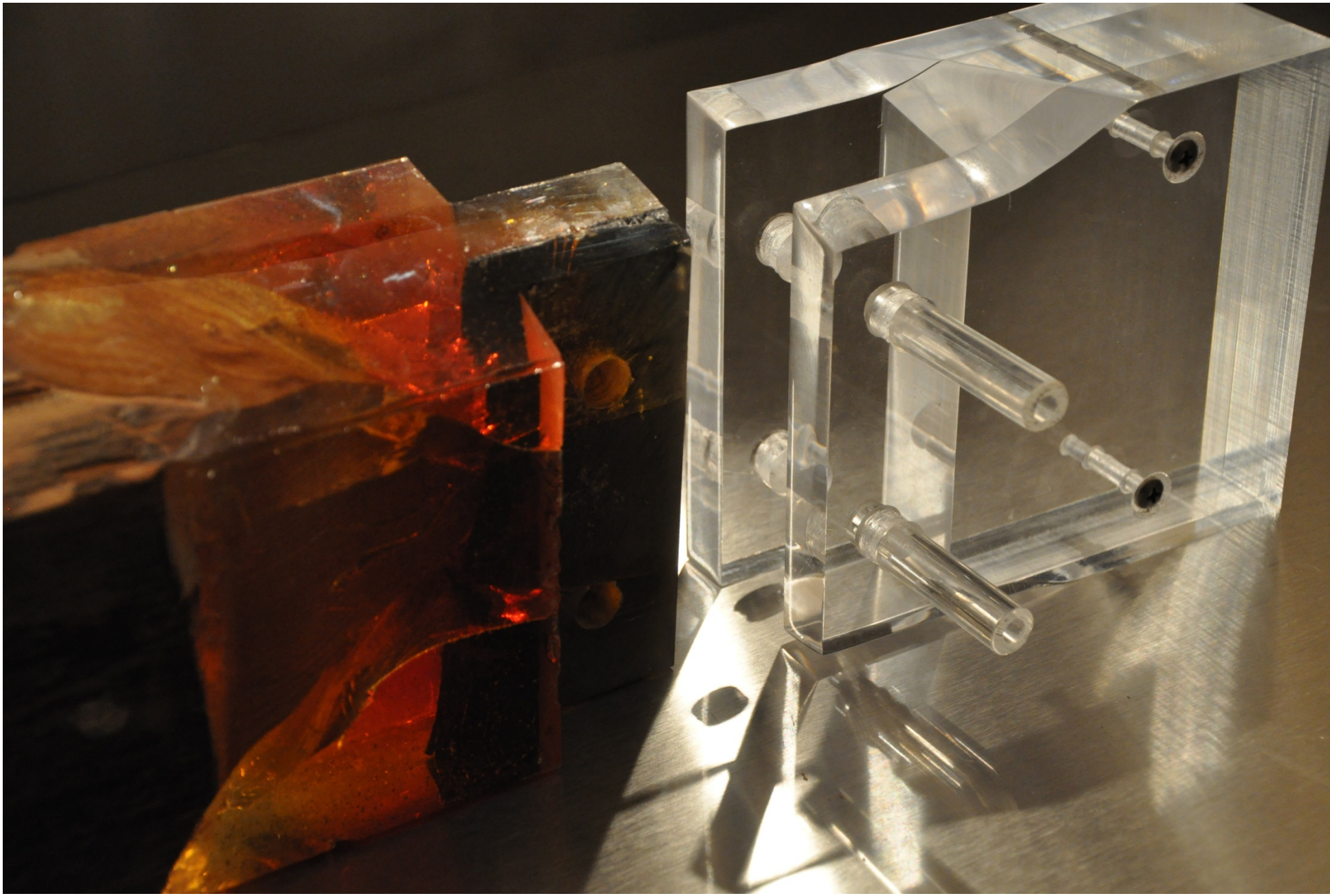
The next is a series of loose blocks bonded on one side with a carbon fiber tape with epoxy.

The next is wood with a slot cut halfway through and a carbon fiber tape folded in half and glued in the slot with Elmer's glue.

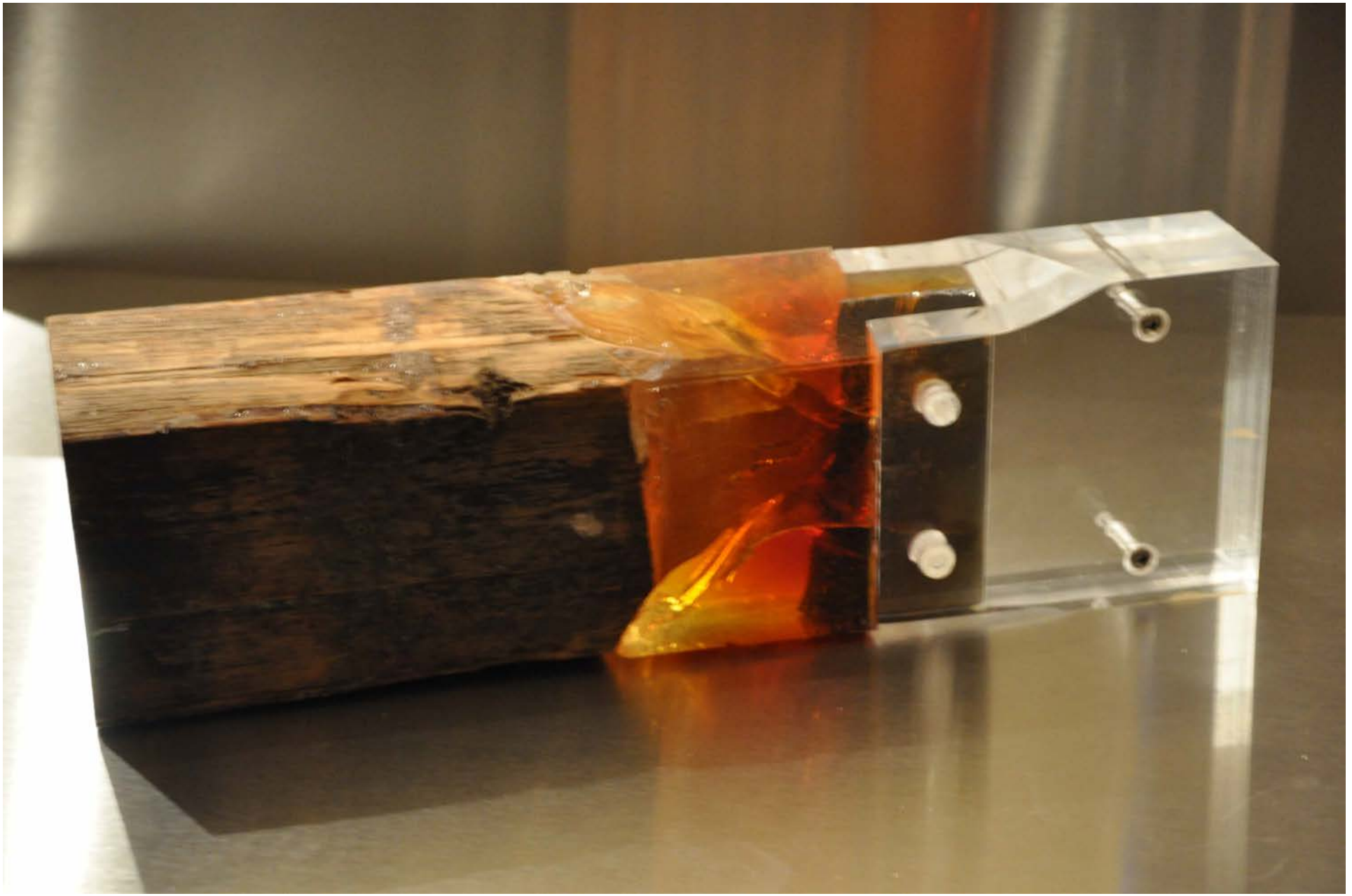
The bottom is wood with one layer of carbon fiber tape epoxied on one side.

The loose blocks backed up with one layer of epoxy impregnated carbon fiber tape is stronger than the unaltered wood. It resisted much more than 1000#


SAT APRIL
Dillon
2-TON
DOW'S
VINTAGE
PORT
DO 2003

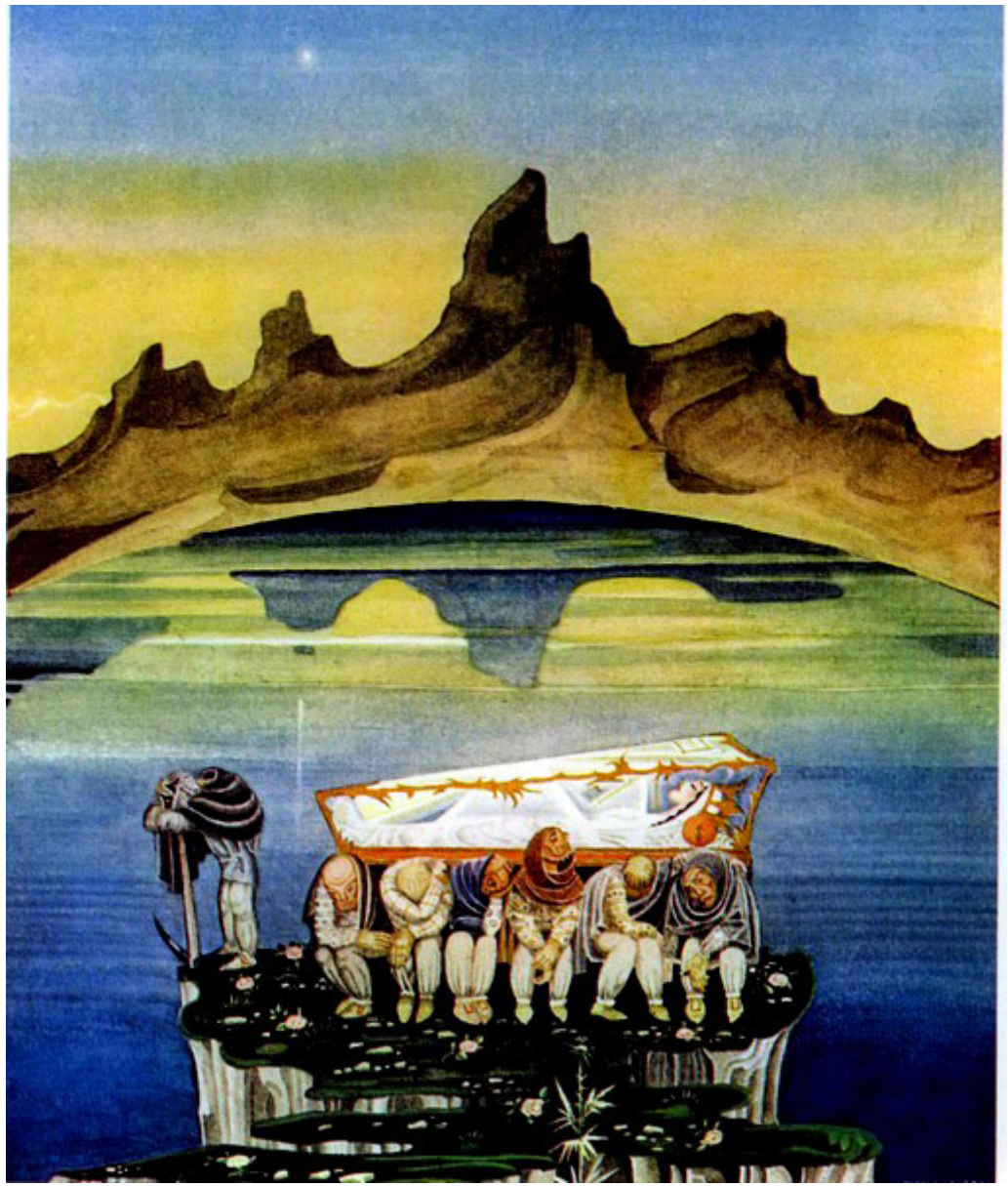


The first crude mockup of what a glass prosthesis might look like



Looking to the future of what a reliquary for Menokin might look like.

And thinking about the seven dwarfs and Snow White’s glass coffin……..



The computer rendering is based on the engineering computer model that sized the glass and fins and anticipated carrying the identified dressed stone of belt courses and window and door dressings within the structural glass walls. The roof was anticipated to be glass with integrated photovoltaics and carried structurally on the original roof timbers augmented with glass members where missing.

Post Script

After the conference

Rain was blowing through this gap in the wall and rather than hang tarps or build a plywood wall as was suggested, we proposed to make a plywood and plexiglass full scale mock-up of what a section of the glass wall might look like. It was the first time a number of folks actually understood the impact.

The mdo plywood and plexiglass were selected because they could be easily cut on site.

The concrete footings were separated from the historic rubble below with a layer of black mylar.

As the missing area now enclosed represented window, as well as wall, we applied a frosted material designed for computer generated signage to interpret the missing windows.

Think about the possibilities of OLED laminated glass. If you have any difficulties you might look to YouTube and Corning’s “A Day Made of Glass” and “A Day Made of Glass II”

John Lee, Charles Phillips, and Tim Macfarlane are no longer associated with the Menokin Site.

The Menokin Foundation has chosen to go in another direction that incorporates little of conservation anticipated in this presentation.

Thanks to:

Hugh Miller,
Retired Senior Historical Architect U.S. Park Service

Richard Wolbers,
Conservator, Chemist, Educator

Rob Cassetti,
Senior Director
Corning Museum of Glass

Peter Drobny
Glass Artist and Technology Guru

Ellen Hagsten
Conservator and Expeditor Extraordinary

for their interest and kind support

http://www.youtube.com/
A Day Made of Glass