Mount Allison
Dendrochronology Lab

Dickson House Tree-ring Measurements and Crossdating

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Abstract

During the fall of 2013, the MAD Lab was contracted to examine the "Dickson House" structure in Hopewel Cape, New Brunswick to determine the date of construction using dendroarchaeological methods. Core samples were taken from structural beams in the basement and the attic of the main building as well as in a secondary structure, the "summer kitchen". These species of the wood samples were identified as red spruce and were crossdated against the MAD lab regional red spruce master chronology in order to establish the kill date of construction timbers for both structures. Definitive end dates were given to all of the 13 samples taken. Six of the seven samples taken in the main structure were given cut dates of either 1829 or 1830. The last of these sample was taken in the basement and was given a later date of 1842. Six samples were taken from structural beams in the "summer kitchen" and attributed dates are all within a five-year window. Half of these samples (13AQD008, 009, and 010) date back to 1858 while the three remaining samples taken in this secondary structure (13AQD011, 012, and 013) were given dates of 1854 1855 and 1856 respectively. Results place construction of the Dickson house in the early 1830's while the secondary structure, the "summer kitchen", was likely constructed a few decades later in the late 1850's.

Introduction

In the fall of 2013 the Mount Allison Dendrochronology Laboratory (MAD Lab) was contracted by Kevin Nesbitt to assess the construction date of the "Dickson House" structures in Hopewell Cape, New Brunswick. These buildings include one main structure and a secondary construction named the "summer kitchen".

Methods

Thirteen core samples were extracted from both of the Dickson House structures on Oct 7th, 2013. These cores were glued to slotted mounting boards before being sanded with progressively finer sandpaper grit: 80, 120, 220, 320, and 400 grit. In the end, the samples were very smooth and radial cell structure was clearly visibly under a microscope. Radial growth (the width of each tree ring) was then measured using a Velmex staging system with an X63 microscope, precise to 0.001 mm.

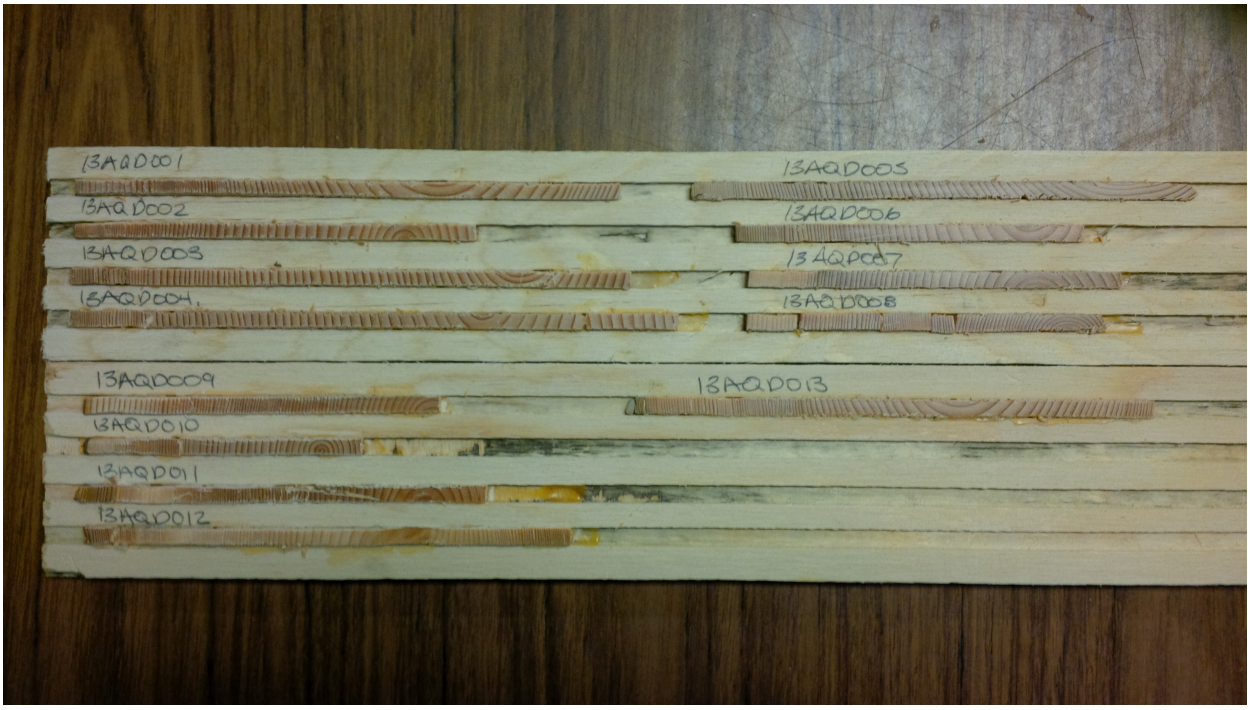


Figure 1: Core samples taken from the "Dickson House" structures. Cores were glued to a slotted mounting board and were sanded with progressively finer sand paper. Annual-growth rings are clearly visible after sanding.

All of the samples were visually identified as being red spruce (*Picea rubens*) and compared with the regional red spruce master chronology available through the MAD lab archive. This regional chronology is composed of over 200 red spruce trees spanning 1624-2006.

The best placement for each time series was decided by first interpreting statistical outputs from the program COFECHA (Holmes, 1986; Grissino-Mayer, 2001). Each series was

then standardized using ARSTAN (Holmes *et al*., 1986) with a negative exponential regression. The standardized chronologies were then graphed for visual comparison with the standardized regional master according to the best crossdating possibilities suggested by COFECHA.

Once final placement was decided, each series were included in the master chronology they was originally compared with and reassessed with COFECHA to ascertain the statistical strength of its placement within the chronology.

Results

Of the 13 samples taken from various locations within the basement, attic and summer kitchen of the Dickson House structures (see Appendix A for rough locations), all were successfully dated and surpassed the minimum level for statistical significance.

Examples of visual pattern matching between the red spruce samples taken from the Dickson House structure and the regional red spruce master chronology can be seen on the following pages. The sample 13AQD001 (Figure 2) was taken from the basement and yielded a cut date of 1829. Sample13AQD003 (Figure 3) was also taken from the basement, this sample revealed a cut date of 1830. Core 13AQD004 (Figure 4), was taken from the basement, a later date of 1842 was given to this sample. Increment 13AQD006 (Figure 5) was removed from the attic of the main structure and a cut date of 1829 was given. Sample 13AQD008 (Figure 6) was extracted from the separate summer kitchen structure and a cut date of 1858 was found. MAD Lab sample 13AQD011 (Figure 7), also taken from the summer kitchen, holds a slightly earlier end date of 1854. Increment core 13AQD012 (Figure 8), once again taken from the summer kitchen revealed a final date of 1855. Finally the last of the red spruce samples 13AQD013 (Figure 9) was taken from the summer kitchen and its final ring was dated to the year 1856.

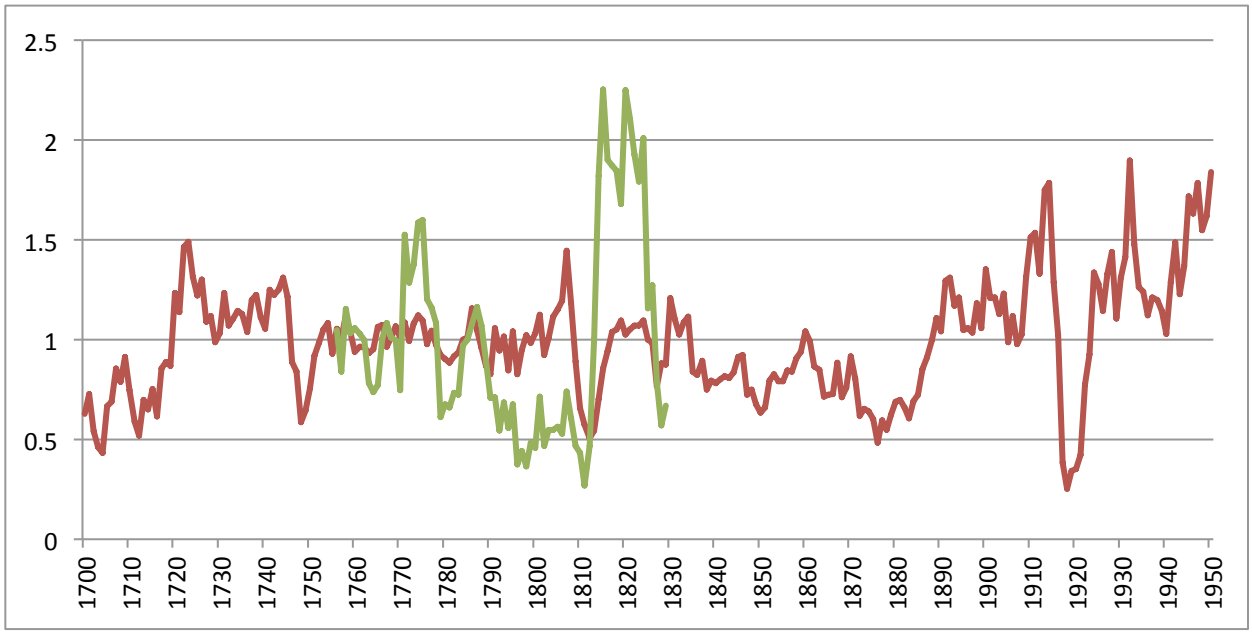


Figure 2: Single standardized series (13AQD001) taken from the "Dickson House" basement and pattern matched to the regional red spruce master chronology for visual crossdating. The end date of this sample is 1829.

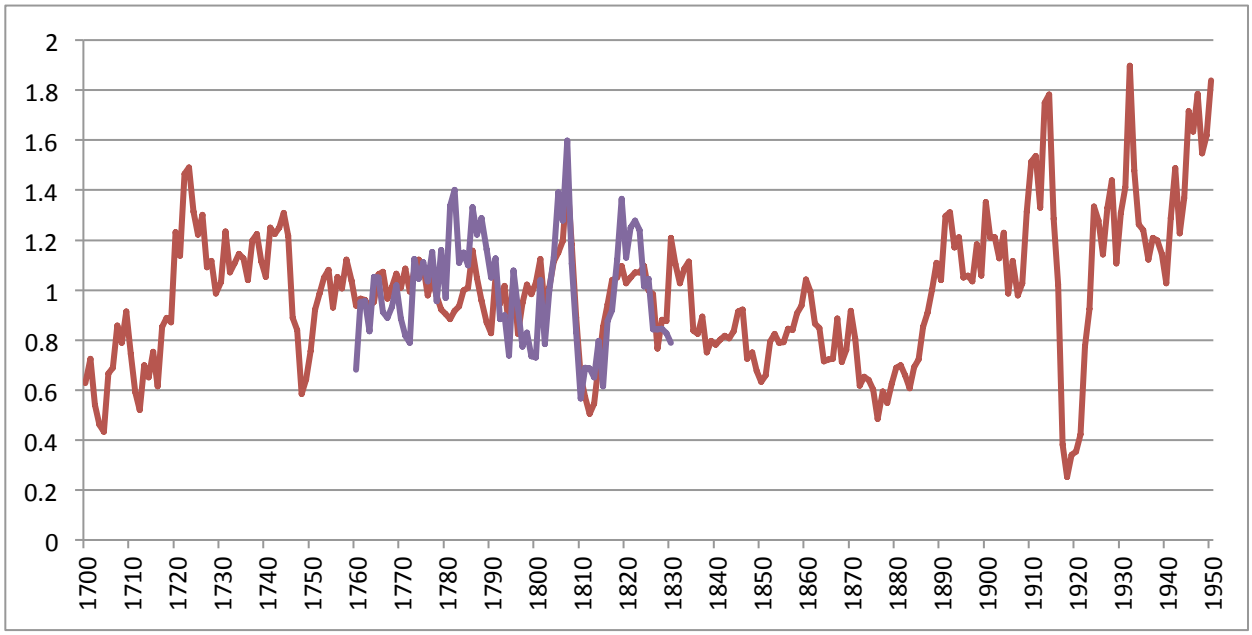


Figure 3: Single standardized series (13AQD003) taken from the "Dickson House" basement and pattern matched to the regional red spruce master chronology for visual crossdating. The end date of this sample is 1830.

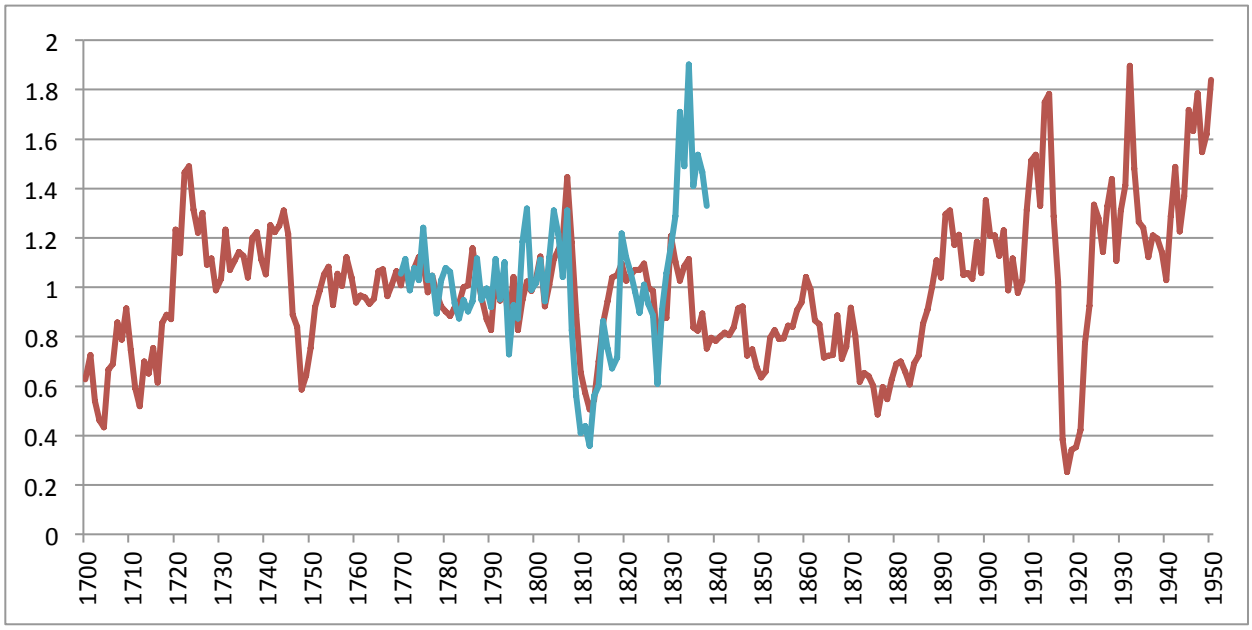


Figure 4: Single standardized series (13AQD004) taken from the "Dickson House" basement and pattern matched to the regional red spruce master chronology for visual crossdating. The end date for this sample is 1842.

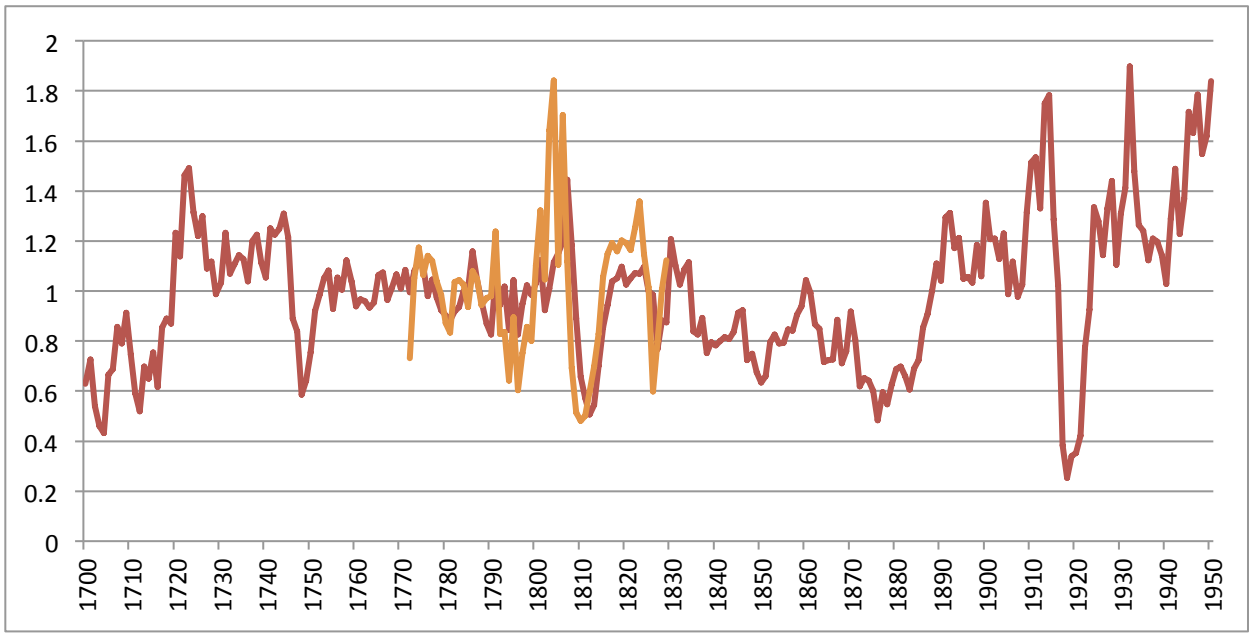


Figure 5: Single standardized series (13AQD006) taken from the attic of the "Dickson House" and pattern matched to the regional red spruce master chronology for visual crossdating. The end date for this sample is 1829.

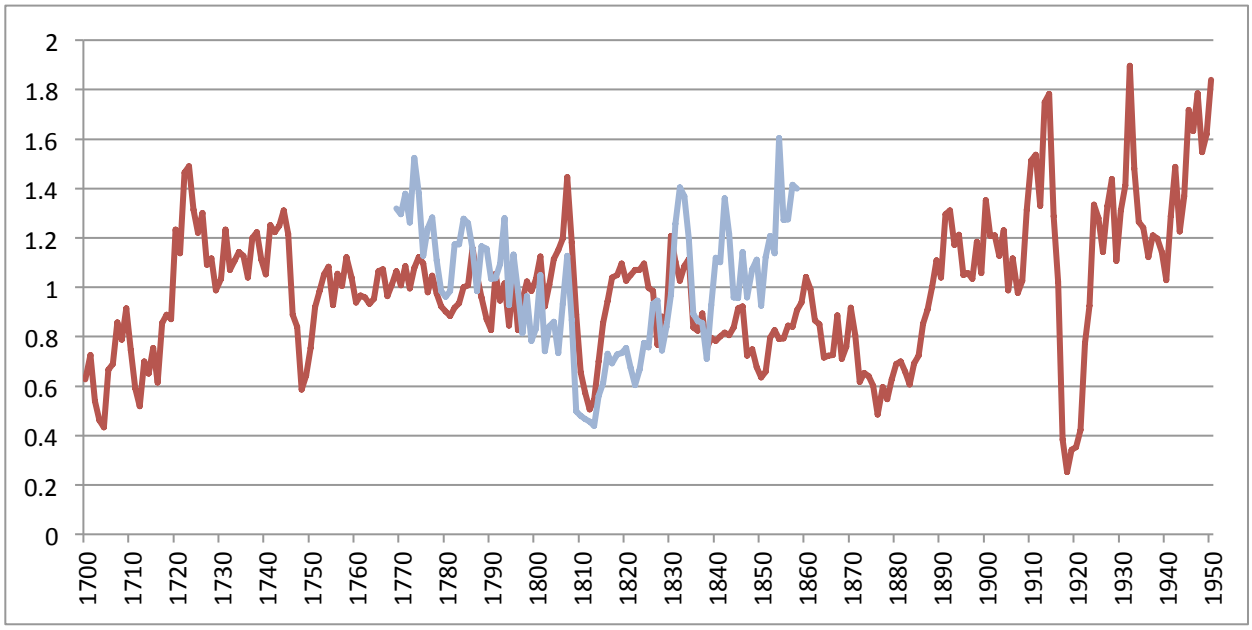


Figure 6: Single standardized series (13AQD008) taken from the "summer kitchen" and pattern matched to the regional red spruce master chronology for visual crossdating. The end date for this sample is 1858.

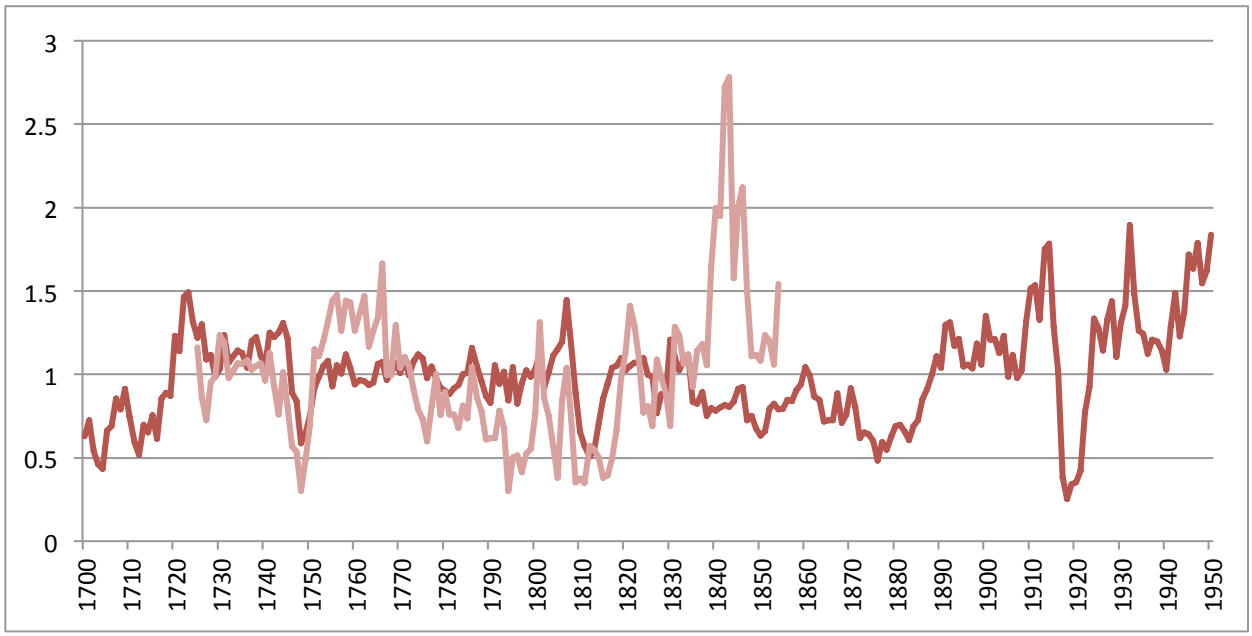


Figure 7: Single standardized series (13AQD011) taken from the "summer kitchen" and pattern matched to the regional red spruce master chronology for visual crossdating. The end date for this sample is 1854.

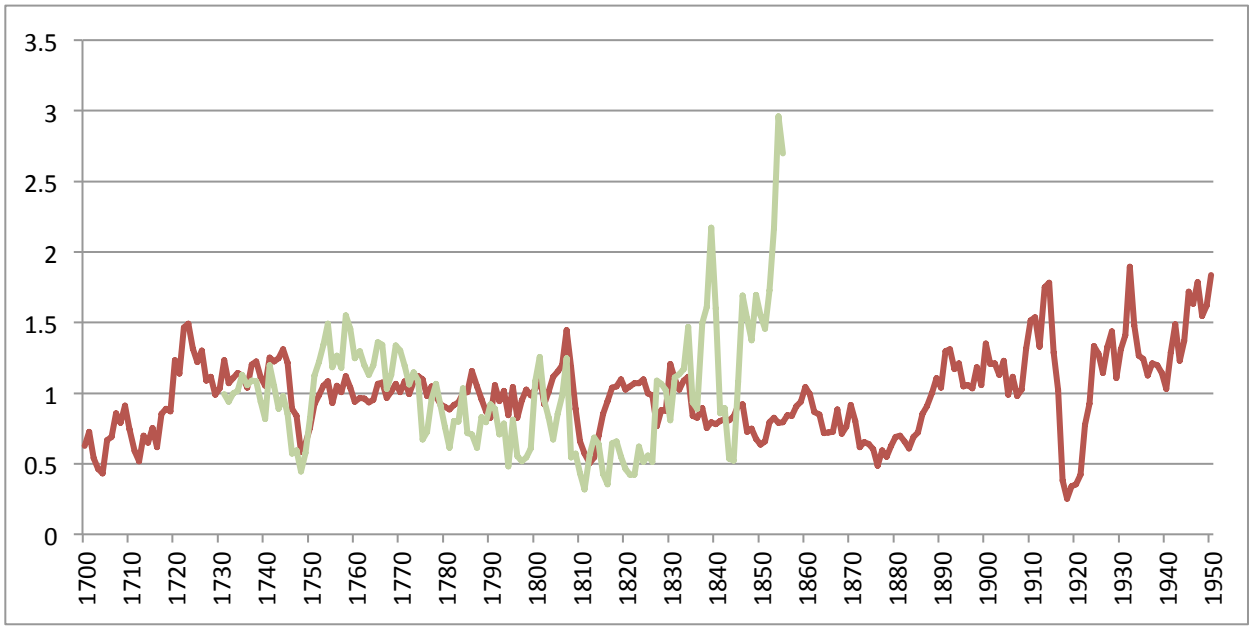


Figure 8: Single standardized series (13AQD012) taken from the "summer kitchen" and pattern matched to the regional red spruce master chronology for visual crossdating. The end date for this sample is 1855.

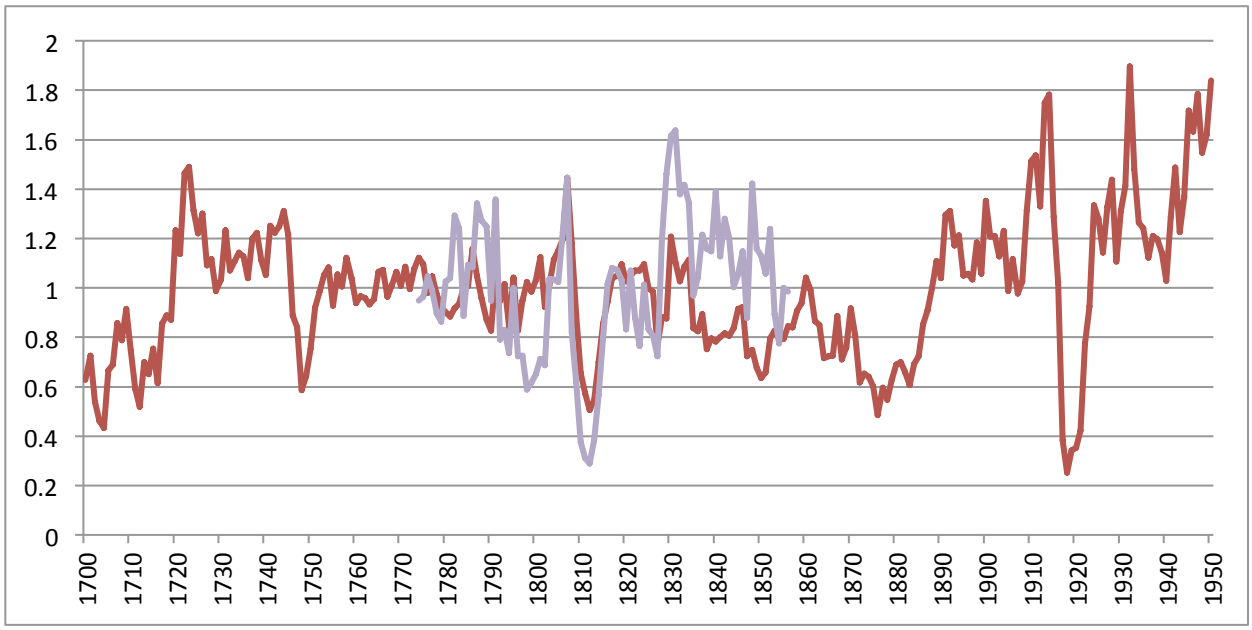


Figure 9: Single standardized series (13AQD013) taken from the "summer kitchen" and pattern matched to the regional red spruce master chronology for visual crossdating. The end date for this sample is 1856.

Table 1 illustrates all sample locations and associated end dates. As is apparent, not all of the final dates can be given definitive cut dates since bark was not found on all beams where samples were extracted. The presence of bark or wormwood (evidence of borer activity found directly under the bark) indicates that the final ring in the sequence is likely nearest the outside of the tree and is therefore representative of the end of the final growing season before the tree was cut down.

Five of the seven samples taken in the main Dickson House structure were given cut dates of either 1829 or 1830. Of the remaining two samples, one was given an end date of 1830 with no evidence of bark or wormwood, and the second was given a later cut date of 1842 suggesting that this wood may have been used during a later repair. All the samples taken in the main structure were taken from structural beams in either the basement or the attic; most had evidence of bark or wormwood on their surface. In the summer kitchen, six samples were taken and five of these were given cut dates spanning the short interval between 1854 and 1858. Only one sample taken from the summer kitchen could not be given a confirmed cut date. The beam where this sample was taken had no bark or wormwood on its surface yet the last ring in its sequence was dated to 1855, which still fits neatly into this five-year window mentioned above.

Table 1: Dickson House sample locations and end dates.

Location	Sample ID	Bark Present	Date of Last Ring	Cut Date
Basement	13AQD001	Yes	1829	1829
=	13AQD002	Yes	1830	1830
=	13AQD003	Yes	1830	1830
=	13AQD004	Wormwood	1842	1842*
=	13AQD005	Wormwood	1829	1829
Attic	13AQD006	Yes	1829	1829
=	13AQD007	No	1830	*
Summer Kitchen	13AQD008	Yes	1858	1858
=	13AQD009	Yes	1858	1858
=	13AQD010	Yes	1858	1858
=	13AQD011	Wormwood	1854	1854
=	13AQD012	No	1855	*
=	13AQD013	Yes	1856	1856

Conclusion

Analysis of the Dickson House structures revealed a very tight clustering of end dates in both buildings. This provides strong evidence regarding the construction of both of these buildings. The construction of the main structure likely took place in the early 1830's and the construction of the summer kitchen took place a few decades later in the late 1850's.

A construction date of 1830 would put the Dickson House as one of the oldest that the MAD Lab has dated in the region, only narrowly being beat by the "Dorchester House" (1821) outside of Dorchester, NB, (Selig *et al*., 2007).

References

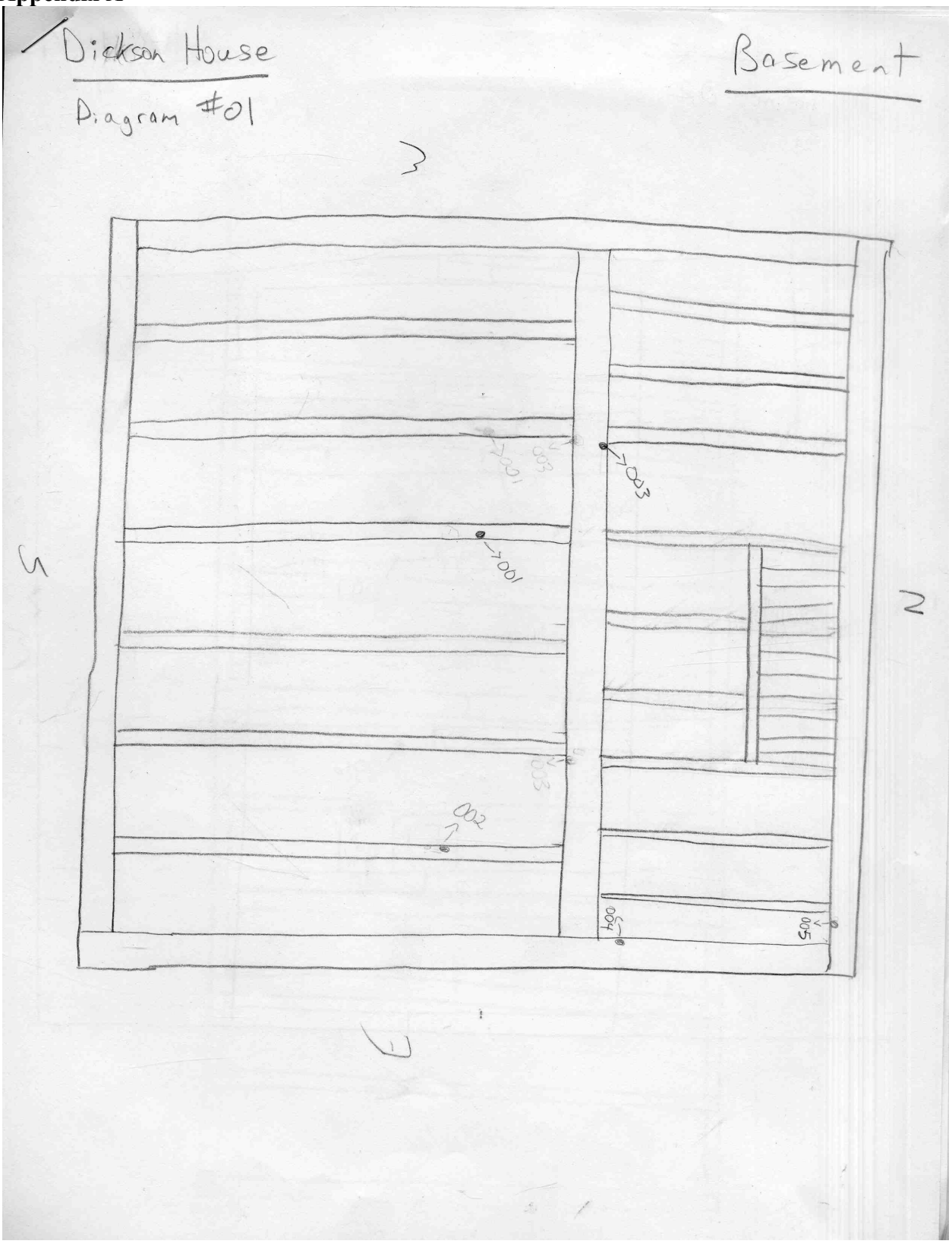
Grissino-Mayer, H.D. (2001) Evaluating crossdating accuracy: a manual and tutorial for the program COFECHA. *Tree-Ring research, 57*, 205-221.

Holmes, R.L. (1986). User's manual for program COFECHA. In *Tree-ring chronologies of western North America: California, eastern Oregon, and northern Great Basin* (eds R.L. Holmes, R.K. Adams & H.C. Fritts), pp. 41-49. Laboratory of Tre-ring Research, University of Arizona, Tucson.

Holmes, R.L., Adams, R.K., and Fritts, H.C. (1986) Tree-ring chronologies of Western North America: California, Eastern Oregon and Northern Great Basin, with procedures used in the chronology development work, including users manuals for computer programs COFECHA and ARSTAN. *Chronology Series VI*. Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Selig, N., Laroque, C.P., and Marsh, S. 2007. Dendroarchaeological investigations in the Maritimes: A case study of Dorchester House, New Brunswick. *Material Culture Review*, 66:42-49.

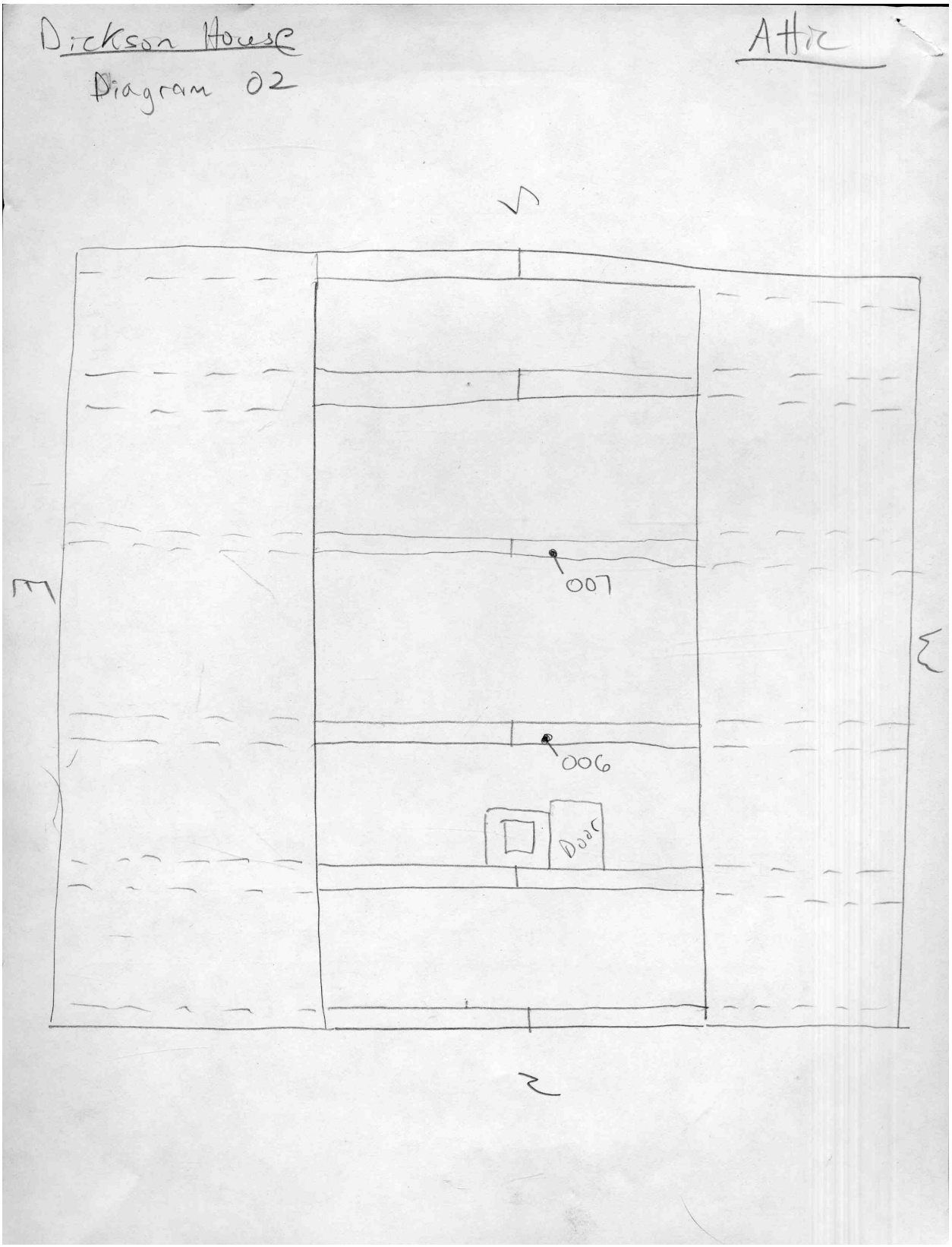
Appendix A


Dickson House
Diagram #01
Basement
001
003
001
003
002
004
005

Dickson House

Diagram 02

Attic

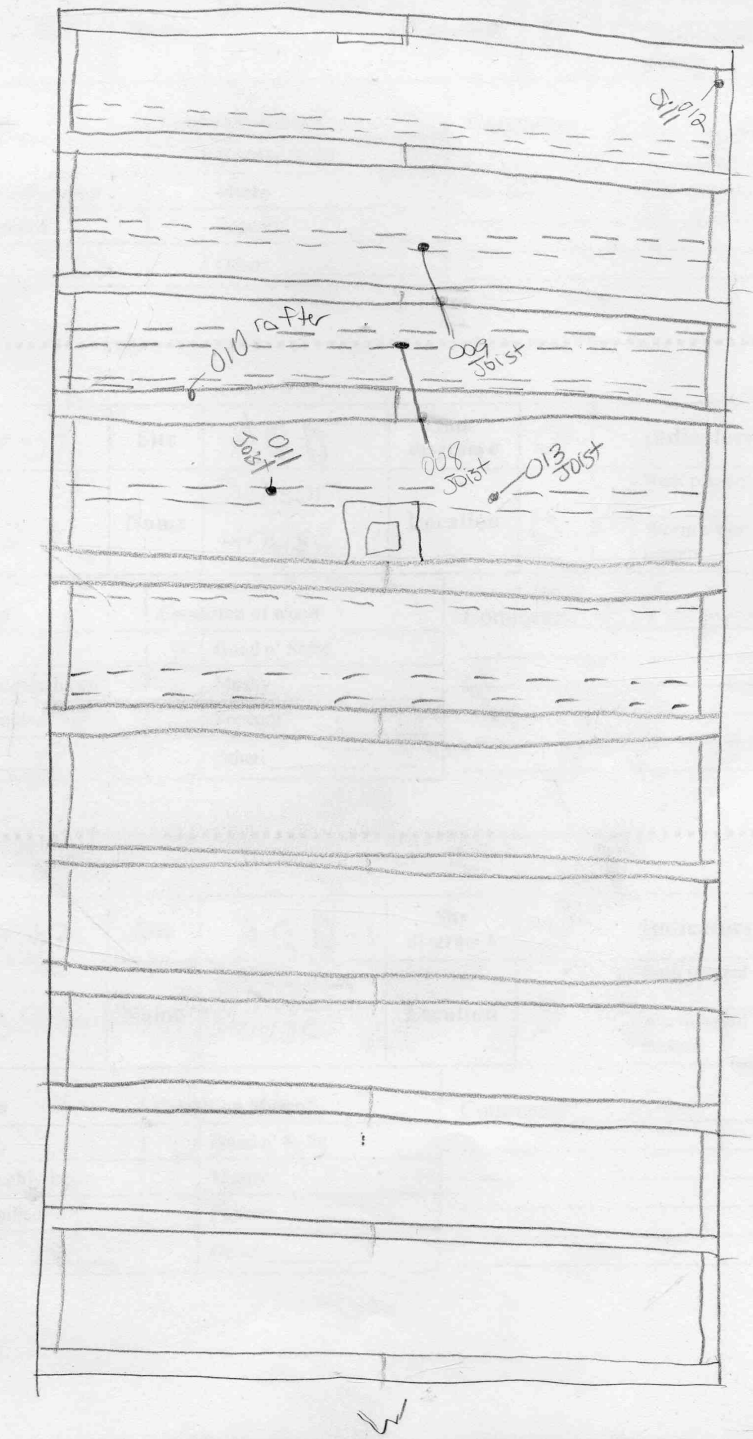


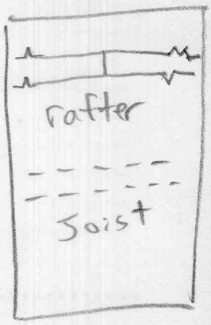
Dickson House

Diagram 03

E

Summer Kitchen Shed





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