A Dendroarcheological Analysis of the Doucet-Hennessy House, Bathurst, New Brunswick

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Contents

Abstract

The Doucet-Hennessy house is a historic building in the city of Bathurst. It is believed to be the longest consecutively occupied building in Bathurst. In order to establish if the house currently standing is part of the original structure or one that has since been erected, Patricia Hennessy contacted the Mount Allison Dendrochronology Laboratory for potential dating of the timbers. Twenty samples were taken from the house, five from the attic and fifteen from the basement. Samples were processed and cross-dated to regional master chronologies of red spruce (*Picea* sp.) and eastern white cedar (*Thuja occidentalis*). Beams from the structures illustrated two periods of construction. Of the beams from the attic, four of the five spruce cores were dated to 1858. In the basement cedar trees were used as main cross-beams and sills, also dating to 1858. In the basement there were also smaller cross-beams made of spruce between the main cedar cross-beams dating to 1811. The spruce beams from the basement could be from the original structure that is believed to have been built within five years of 1807. Their presence in this building indicates that the wood was recycled into the support of the current building.

Introduction

The Doucet-Hennessy [also *Doucette*-Hennessy] house has recently been designated a local heritage site by the City of Bathurst and noted for its architecture. The original land grant was issued in 1807 to Charles Doucet, specifying a building had to be built within five years. To ascertain if the standing building is the original or if it was constructed with parts of the original building, Bill Hicks of the New Brunswick Department of Wellness, Culture and Sport suggested a dendrochronological study. In early November of 2009, Patricia Hennessy contacted the Mount Allison Dendrochronology Lab (MAD Lab) and on December 7, 2009 members of the MAD Lab sampled the Doucet-Hennessy House.

The Doucet-Hennessy property has primarily been in the possession of either the Doucets or the Hennessys since 1807. In 1914, the property was first inhabited by the Hennessys as it still is to this day. The original house was believed to have been built within five years of 1807 by Charles Doucet, however the construction date of the standing building is unknown. In 1837, a surveyor conducted a survey in Bathurst as part of the Kings Survey (Figure 1). During this early survey the house appears to have been a one storey house with an attic, and a chimney in the centre of the house.

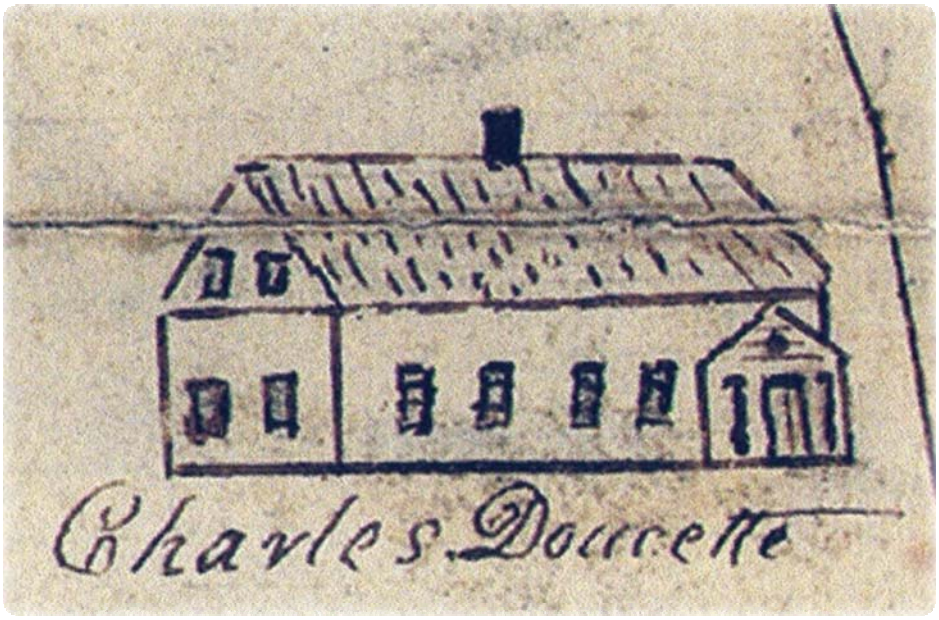


Figure 1. Doucet House from the Kings Survey 1837.

The current layout of the Doucet-Hennessy house is a 'T' shape; it has two stories with an attic and no brick chimneys (Figure 2). The basement of the building has remnants of two brick chimneys, one on each side of the front section of the house that have since been taken apart. These two chimneys are remembered by members of the Hennessy Family.

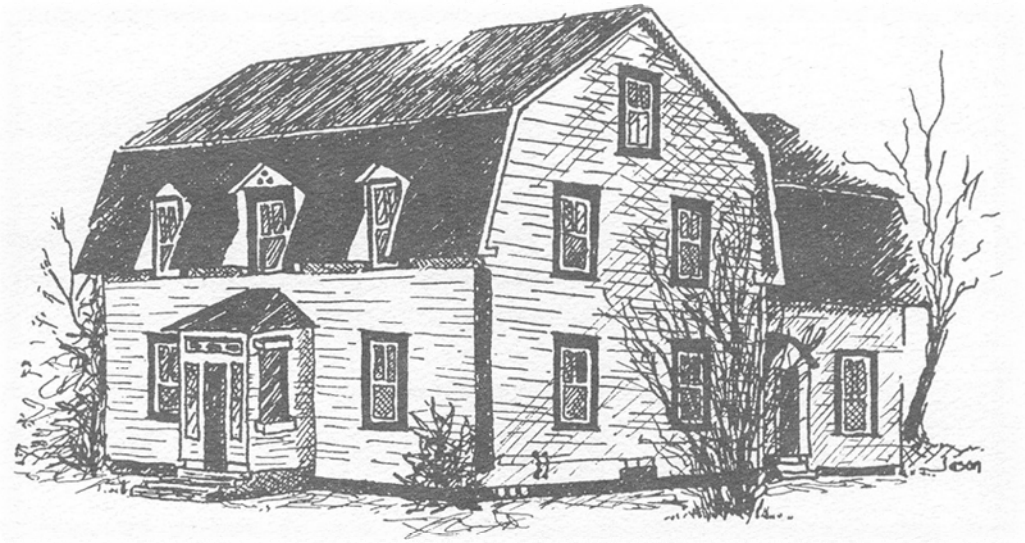


Figure 2. Doucet-Hennessy House, Bathurst, NB. (Bathurst Heritage Trust Commission)

The roof appears to have been constructed in three phases (Figure 3). The gable end of the original pitched roof can be seen with the wall beams and a covered attic window (Figure 4). The second roof is of mansard style and can be seen arching over the original gable from the joint of the "T" construction of the house, which is roofed over by the third roof (Figure 5).

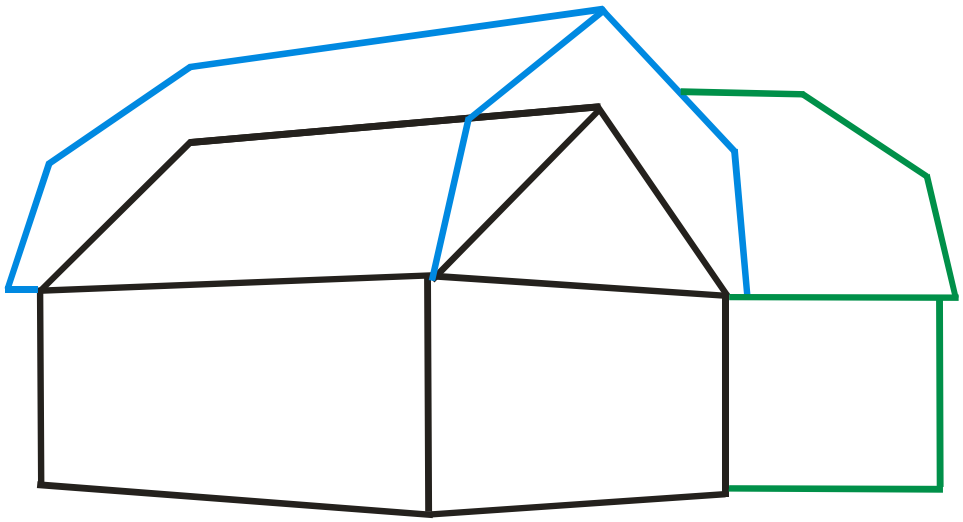


Figure 3. The evolution of the Doucet-Hennessy House roof. The first structure (black) was erected, then an additional level with a new roof (blue), and finally an additional wing and roof was added later on (green).

Figure 4. Samples 09ARS003, 4, and 5 taken from the south side of the attic. The image also illustrates the remnant gable end of the original roof with the sampled exterior wall beams (centre), a covered attic window (top left) and the original roof line (top right).

The basement is structurally supported by six large cedar (*Thuja occidentalis*) beams. Four composed the sill and the other two are the main cross-beams in the basement. There are smaller milled cross-beams in the basement running north-south from sill to sill (Appendix I). Additionally, there were smaller axe hewn spruce (*Piecea* sp.) cross-beams between the two main cedar cross-beams. These axe hewn cross-beams appeared to have been recycled from a previous structure, due to unused wooden pegs.

Methods

The Doucet-Hennessy House is located in Bathurst, New Brunswick at the top of Village Hill (Lat. 47^{o} 37'40.51" N, Long. 65^{o} 39' 51.76" W). Samples were taken from what is believed to be the original section of the house (Figure 3). In total, 20 samples were collected from the Doucet-Hennessy house. Five samples were taken from the vertical beams in the attic (Figure 5) and 15 were taken from the basement (Figure 6). Twelve of the samples from the basement were taken from large cedar beams that made up the sill, main cross-beams and two small vertical supports, the other three were from smaller axe hewn spruce cross-beams. Samples were labeled with the MAD Lab code 09ARS000 and the location and condition of each sample was noted (Appendix I).

Figure 5. Interior view of the second and third roofs arching over the remnant gable of the original roof (note the original covered attic window in the centre of the image beyond the frame of the second roof).

Figure 6. Samples 09ARS013 taken from the northern side of the western sill in the basement.

Samples were processed in the lab by mounting them in slotted mounting boards, then sanding them with progressively finer sand paper (80-400 grit) to bring out the cellular structures and annual rings of the wood. Rings were counted and measured from the bark to the pith (middle) of each core sample using a Velmex measuring system with an accuracy of 0.001mm. Not all the cores were sound (see Appendix II), some of them had broken or rotten pieces in the outermost perimeter of wood.

A time series of measurements from the house were pattern-matched to one another, thereby creating floating chronologies (chronologies that are not attached to a specific period of time). The floating chronologies were then cross-dated to a previously establish master chronology that is locked in time from the area. Cross-dating is the practice of taking the pattern of growth from one sample and comparing it to that of another (Figure 7).

To assist in the cross-dating procedure, the statistical cross-dating program COFECHA (Holmes, 1986a) was used. COFECHA uses correlation values to assist in accurately dating samples. Higher correlation values indicate that the floating chronology corresponds well to the master chronology. Lower correlation values can indicate a variety of things such as ecological or climatic variation from the norm or that the sample is inaccurately dated. The floating chronologies were run against corresponding master chronologies of red spruce (*Picea rubens*) and eastern white cedar (*Thuja occidentalis*) available from the MAD Lab archives. Each of the floating and master chronologies were standardized to have a mean of one by using a negative exponential curve in the program ARSTAN (Holmes,1986b). This standardization was completed to allow samples of different ages to be compared.

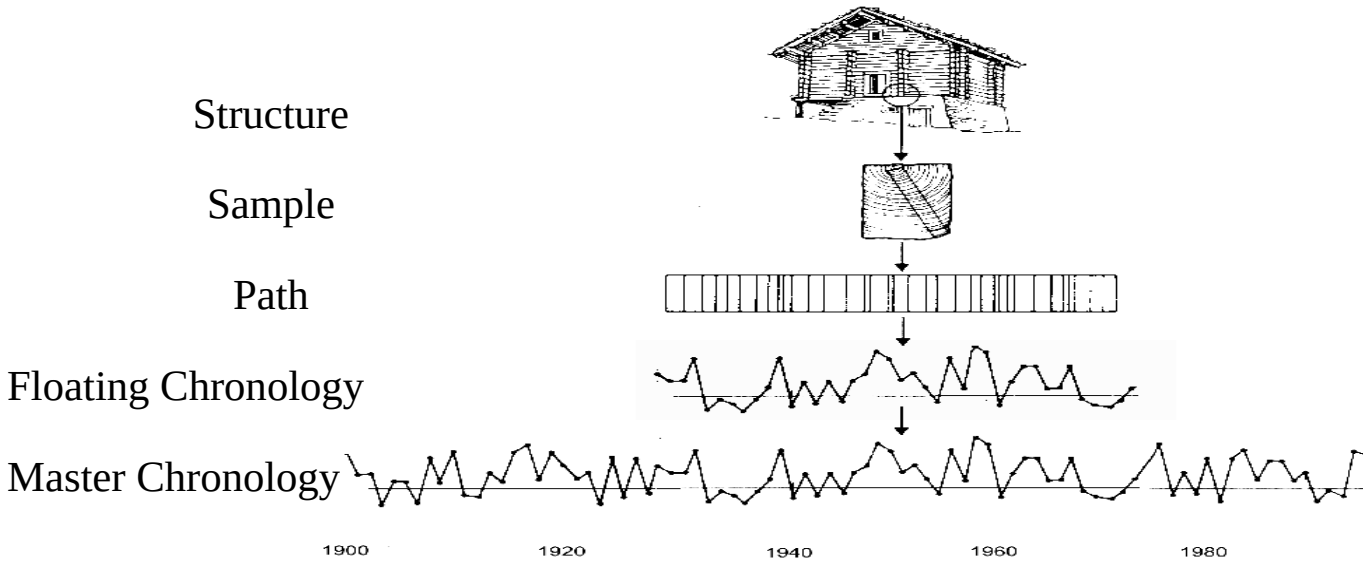


Figure 7. Example of cross-dating by using patterns from a structure (floating chronology) compared to the master chronology.

Results and Discussion

Samples from the Doucet-Hennessy house dated to two distinct periods 1811 and 1858 (Table 1). The samples taken from the vertical beams in the attic were determined to be spruce. Of the five samples taken, four were dateable to roughly 1858. The age of the wood in the basement differed between species. The cedar beams that composed the sill and the main cross-beams dated to 1858 and lacked latewood in the final year of growth suggesting they were cut mid-growing season (~early-July). Two cedar beams used as supports on one of the partially dismantled fireplaces were from 1834 and 1828 (Appendix I, samples 10 and 11). This suggests that these beams were recycled wood that were previously cut and used as supports. Three smaller axe hewn cross-beams of spruce were sampled from the basement; two of the three were dateable. The two spruce cross-beam samples were dated to 1808 and 1811.

The overall correlations within the Doucet-Hennessy cedar chronologies were significant with an r-value of 0.520 (all values over 0.3281 are significant to the 99% confidence interval). The spruce from the attic produced an r-value of 0.400 and the r-value of the spruce from the basement was 0.423 (Table 2). The cedar chronology from the house cross-dated against the master cedar chronology with a low r-value of 0.256. The spruce from the attic dated well to the master spruce chronology with an r-value of 0.639 (Table 3), while the spruce from the basement again did not correlate as well to the master chronology with a low r-value of 0.297.

The cedar master chronology was from northern New Brunswick. Although, the correlation between the cedar master and the Doucet-Hennessy cedar master is low, the >200 year length of the pattern match makes it statistically significant and the visual match is undeniably convincing. The low correlation value with the master chronology and the extremely large size of the basement sills and main cross-beams (estimated to be 40 to 50 cm in diameter near 11 to 13 m up the stem of the trees) indicates that these cedar timbers may have been transported from some distant away by way of water. It is unlikely that trees of such size would have still been growing in the immediate Bathurst area in the 1850's.

Due to the poor correlation to the master chronology the spruce cores from the basement were compared to those from the Robichaud House (05JS00) and Barn (05KS00) from the Acadian Village near Caraquet. The Robichaud House and barn are believed to have come from Inkerman and Paquetville, on the Acadian Peninsula of New Brunswick. These buildings are the closest structures the MAD Lab has sampled to the Doucet-Hennessy House covering the proper time period and containing spruce. Due to these reasons it is likely that they share a more common climatic signal with each other than with the master spruce chronology which is derived mainly from the southern portions of the province. Using visual assessment along with correlation values between the spruce samples from the basement and the Robichaud Buildings (05KS/JS), the cores were placed in time at 1808 and 1811 (Figure 9 B) with a correlation of 0.332 (Table 3).

Table 1. Sample ID, location, species, time spans, number of years, interseries correlation (Corr.) and the presence of end wood for each sample taken from the Doucet-Hennessy house.

Sample	Location	Species	Time Span	# of years	Corr.	End wood
09ARS001	Attic	Spruce	1805-1835	31	0.232	No
09ARS002	Attic	Spruce	1799-1858	60	0.394	Present
09ARS003	Attic	Spruce	1801-1847	47	0.595	Present
09ARS004	Attic	Spruce	1792-1853	62	0.335	Present
09ARS005	Attic	Spruce	NA	NA	NA	No
09ARS006	Basement	Cedar	1649-1843	195	0.593	No
09ARS007	Basement	Cedar	1717-1858	142	0.550	Present
09ARS008	Basement	Cedar	1643-1858	216	0.484	Present
09ARS009	Basement	Cedar	1699-1858	160	0.491	Present
09ARS010	Basement	Cedar	1655-1828	174	0.429	Present
09ARS011	Basement	Cedar	1654-1834	181	0.390	Present
09ARS012	Basement	Cedar	1640-1854	219	0.550	Present
09ARS013	Basement	Cedar	1725-1838	114	0.559	No
09ARS014	Basement	Spruce	1711-1808	99	0.423	No
09ARS015	Basement	Cedar	1623-1835	213	0.568	No
09ARS016	Basement	Cedar	1625-1818	194	0.426	No
09ARS017	Basement	Spruce	1724-1811	89	0.423	Present
09ARS018	Basement	Cedar	1698-1858	161	0.592	Present
09ARS019	Basement	Cedar	1689-1858	170	0.635	Present
09ARS020	Basement	Spruce	NA	NA	NA	No

Table 2. Descriptions of chronologies constructed from the Doucet-Hennessy House. Location of cores, number of cores, interseries correlation value (Corr.), time span of chronology, length of chronology and the average length of each of the three chronologies.

	Location	# of cores	Corr	Time Span	Length	Average length
Spruce	Attic	4	0.400	1792-1858	67	50.0
	Basement	2	0.423	1711-1811	101	93.0
Cedar	Basement	12	0.520	1623-1858	236	178.3

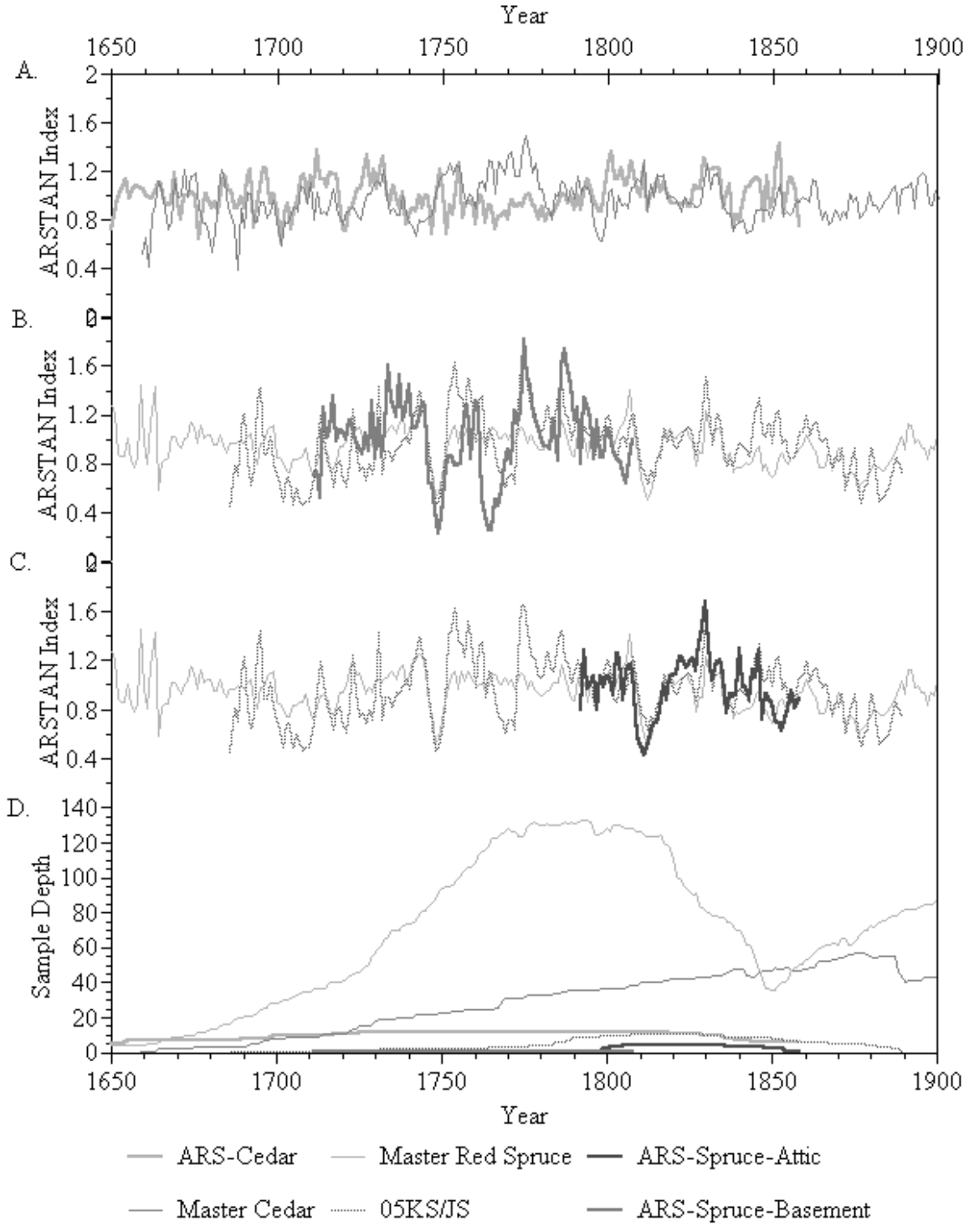


Figure 9 – (A) Comparison of the master cedar chronology and the floating chronology of ARS-Cedar from the basement, (B) Comparison of the master spruce chronology, 05KS/JS chronology and the floating chronology of the ARS-Spruce from the basement, (C) Comparison of the master spruce chronology, 05KS/JS chronology and the floating chronology of the ARS-Spruce from the Attic, (D) Sample depth for each of the chronologies.

Table 3. Correlation matrix of the standardized spruce chronologies.

	Master Spruce	05KS/JS	ARS-Spruce-Attic	ARS-Spruce-Basement
Master Spruce				
05KS/JS	0.528			
ARS-Spruce-Attic	0.638	0.592		
ARS-Spruce-Basement	0.297	0.332	0.060	

Though the correlation and visual matching of the patterns belonging to the basement spruce beams are weaker than we would like to see, they demonstrate a relationship with existing historical data on the house. It is believed that the original structure of the Doucet House was built in the early 1800's. These spruce cross beams could be recycled pieces of the original structure that was built after Charles Doucet was granted the land in 1807 with instructions to build a house within five years. Additional, clues that this may be the case come from the physical attributes of the beams themselves. There are holes and pegs in the cross-beams that are unused, indicating that they are likely recycled beams from a pre-existing structure.

Other construction features help determine that this was not the original structure built on this land. The original drawing of the house created during the Kings survey in 1837 depicts a house with a chimney in the center of the building, a different placement and number of windows, and an offset entry way. In the basement of the current structure, remnants of two chimneys symmetrically placed on either side of the staircase are present. These chimneys are not in agreement with the Kings Survey drawing, nor are they consistent with Acadian architecture of the period. The structure pictured in the Kings Survey drawing is reminiscent of early 19th century Acadian architecture.

The standing structure, with its symmetrical layout including the centrally placed chimneys, central hallway and staircase, and symmetrical rooms two deep, is more reminiscent of the Georgian style architecture used by English colonies. The chimneys were removed, most likely when the original pitched roof was replaced by the mansard style roof (second roof), as there is no evidence of chimneys ever protruding through the second storey. One of the disassembled chimneys had two beams used as supports that dated to the 1830's, suggesting that these chimneys had been removed long ago, using recycled wood as replacement supports.

Charles Doucet was one of the original settlers in the Bathurst area and also one of the wealthiest. The land grants he received in 1807 were for 182 acres. He donated money for the original construction of the Roman Catholic Church across the street from the Doucet-Hennessy house, and his house also acted as the rectory. Due to his wealth and prestige, Charles Doucet may have opted to construct a more modern, stylish house in 1858 to complement his life style.

Conclusions

The construction of the Doucet-Hennessy house is 40 years newer than the suspected date of construction (1858 not 1811). The structure was believed to have been built within 5 years after 1807 when Charles Doucet was granted the land. The standing original portion of the house was built in 1858 with large cedar beams for the sill and main cross-beams while spruce was used for the framing of the building. The smaller spruce cross-beams in the basement dated to 1808 and 1811. These beams were potentially recycled wood from the original Charles Doucet House constructed around the time of the land grant in 1807. The cut dates of the timber used in construction, as well as inconsistencies with the architecture both indicate the original house was replaced, with the standing house most likely constructed in the fall of 1858 or the spring of 1859.

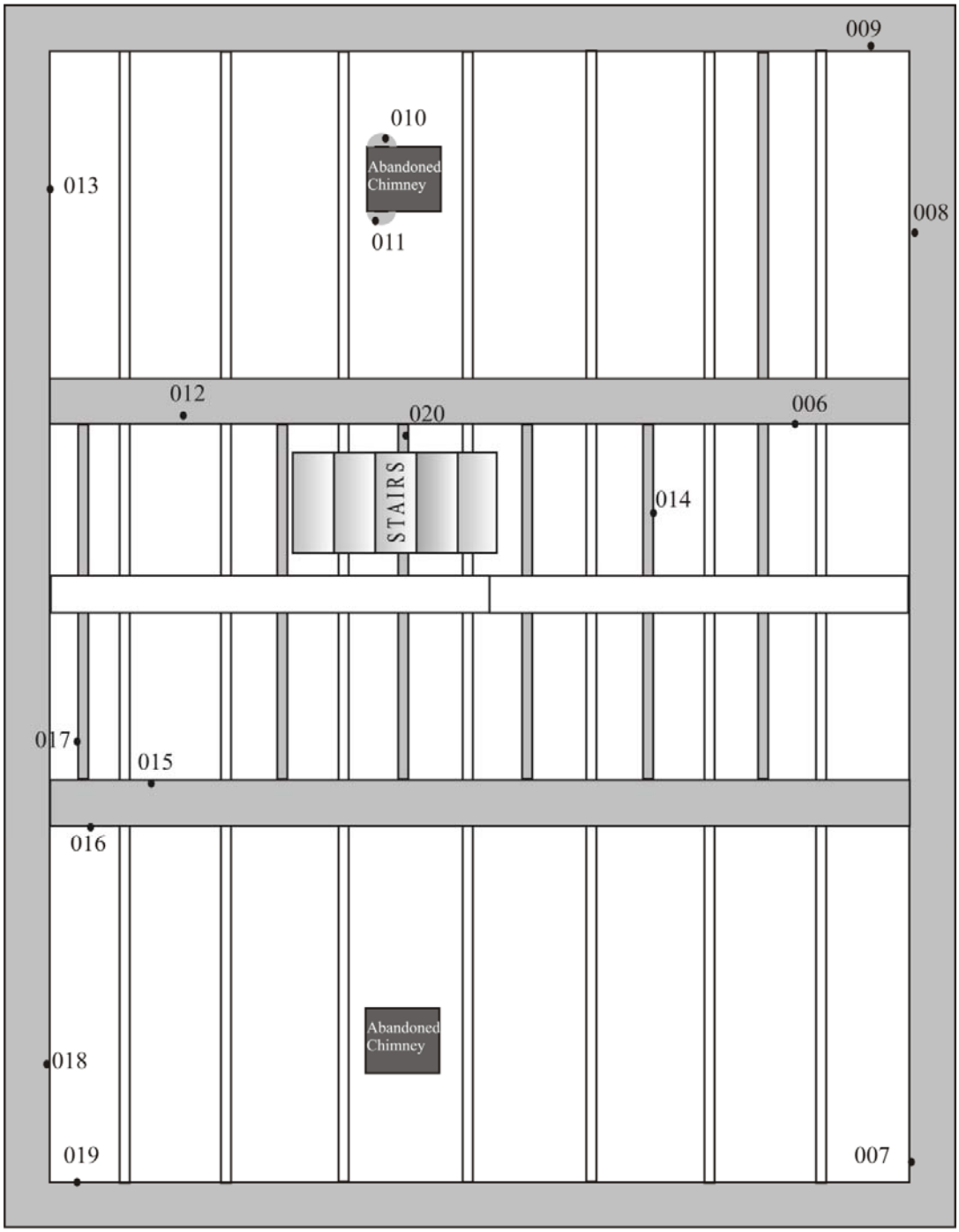
References

Holmes, R.L. (1986). Users 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 Tree-Ring Research, University of Arizona, Tucson.

Holmes, R.L., Adams, R.K., & Fritts, H.C. (1986) Users Manual for Program ARSTAN. 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. 50-65. Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Appendix I. Floor plan for the basement of the Doucet-Hennessy House. The older axe hewn beams are in grey (sills and major cross-beams are cedar and the minor cross-beams are spruce) and newer milled lumber are in white.

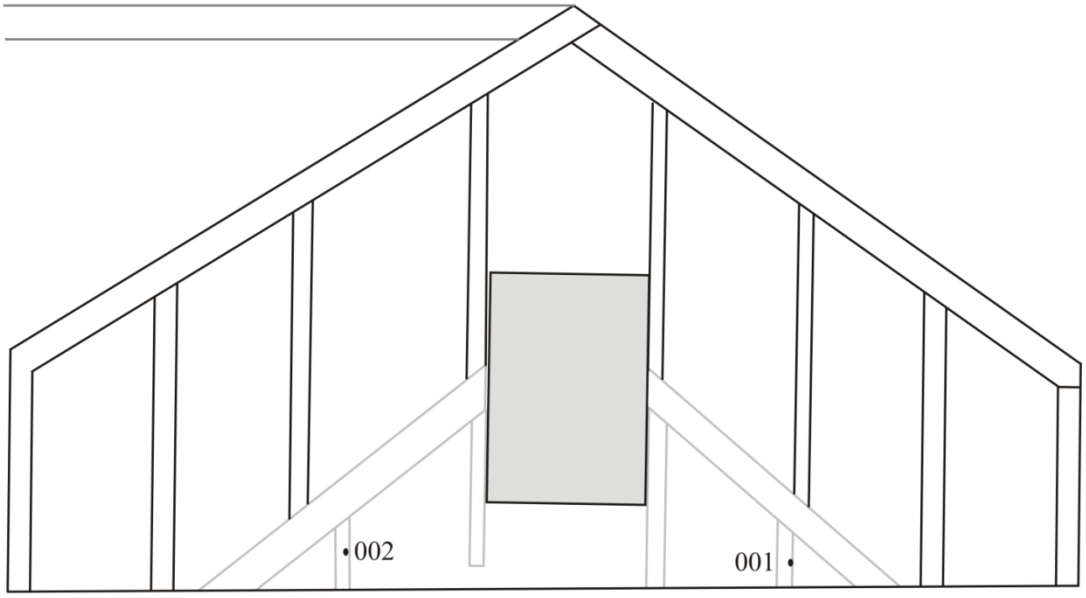
North

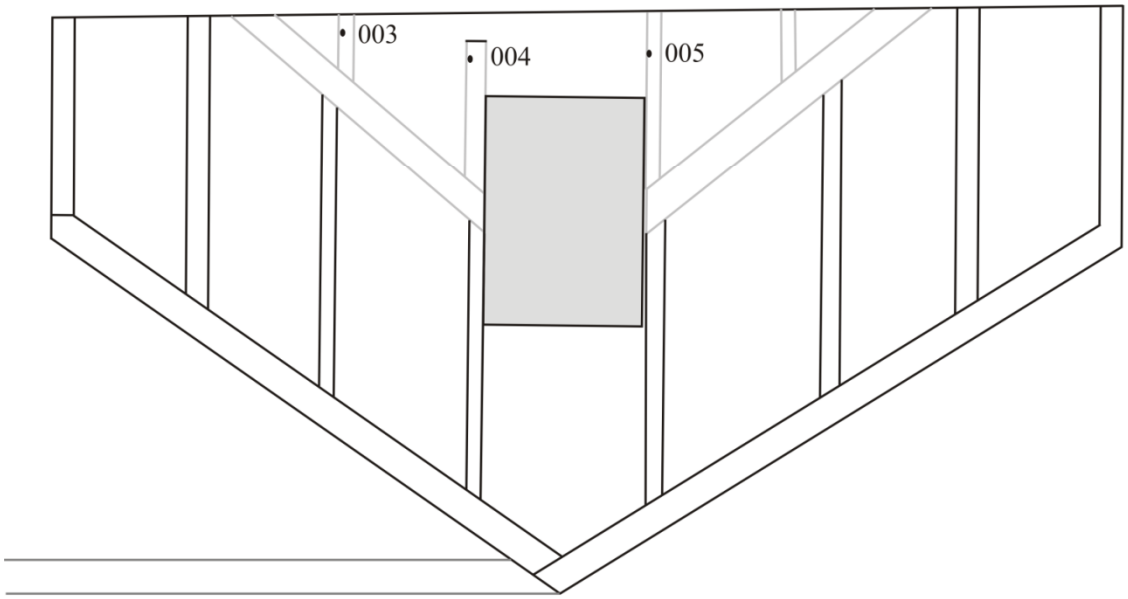


South

Appindex 2. Roof supports in the attic. Grey box represents the window, light grey beams represent the original supports and dark grey represents the supports from the second roof.

North





South


09ARS001 - Attic
09ARS002 - Attic
09ARS - Attic
09ARS - Attic
09ARS005 - Attic
09ARS006
09ARS 007
09ARS008
09ARS009
09ARS010
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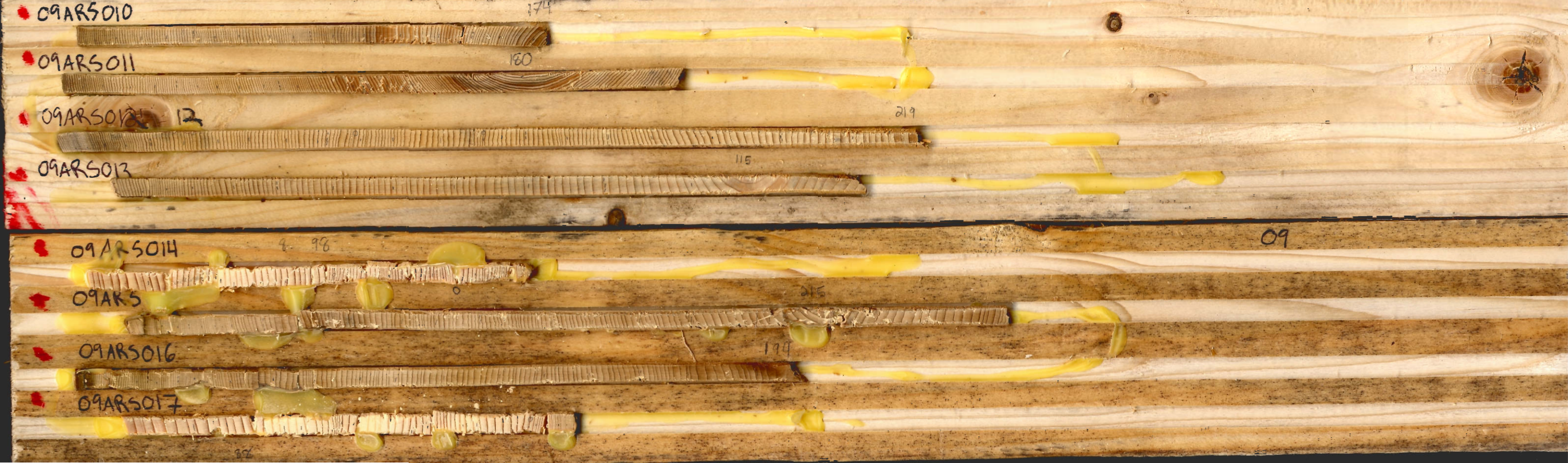
09ARS013


09ARS010
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