MSU Campus Archaeology

MICHIGAN STATE UNIVERSITY

Analyzing Construction Nails Excavated from MSU's Station Terrace Site

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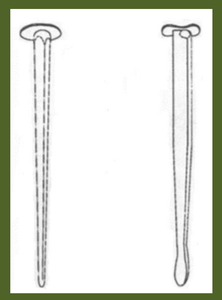
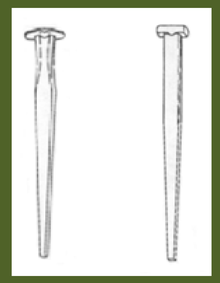
Introduction

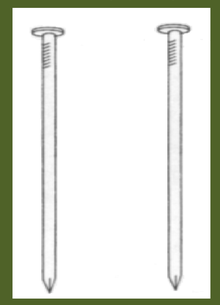
Construction nails in North America evolved in several phases, each of which possess unique identification markers that can ultimately be used to assist archaeologists in dating historic archaeological structures. One such phase roughly coincides with the time range in which an early campus building was constructed. By analyzing the nails recovered from this site, it may be possible to narrow the date of construction by one to two years.



Hand-Wrought Nails



Type A (left) and Type B (right) machine cut (square) nails



Wire Nails

All images from Wells, 1998

Station Terrace

Built between 1890 and 1895, the building known as Station Terrace served many different purposes. The building, which was located near the southern end of the current Abbot Road median, was originally used to house extension faculty. A few years later, it became home to MSU's bachelor faculty. In January of 1903, the building suffered heavy fire damage and, upon its restoration, became home to the East Lansing Post Office and a Trolley Car waiting room before women from the Home Economics program turned the building into the Flower Pot Tearoom café in 1921. Rather than being demolished, in 1923-1924, the building was moved to its current location on the corner of Ann and Durand Streets.

Station Terrace – Photo courtesy of MSU Archives & Historical Collections

Shovel Test Pits (STPs) were conducted during the summer of 2016 by Campus Archaeology ahead of the landscape rejuvenation project to be completed in the Abbot Road median. A stone foundation, water and sewage pipes, a concrete floor, corroded nails, a pair of men's shoes, and a complete paste jar were recovered. The subsequent excavation completed by the 2017 Summer Field School students revealed more of the building foundation, countless nails, broken glass, bricks, wire insulators, small pieces of ceramic, and a burn feature.

Research Goal

One phase in the evolution of construction nails – the replacement of wrought iron with steel as the primary production material – coincides with the five-year time range Station Terrace is believed to have been constructed. As a result, the Station Terrace assemblage could contain both wrought iron nails from the original construction of the building, and steel nails used during later renovations. If wrought iron nails are present in this collection, it can reduce the estimated date of construction for the building by one to two years. A random sample of six nails from Station Terrace were analyzed using portable X-Ray Fluorescence (pXRF) to determine if it was feasible to use chemical composition to identify nails used in the original construction of the building.

References

Bright, Lisa
2016 Station Terrace: A Building with Many Identities. *CAPBlog*. Electronic document, http://campusarch.msu.edu/?p=4255, accessed March 1, 2018.

MSU Archives: Campus Post Office 1892-1911. Folder 94, Box 826 Collection UA4.9.1

Wells, Tom
1998 Nail Chronology: The Use of Technologically Derived Features. *Historical Archaeology*, 32(2): 78-99.

Methods

To limit the likelihood of obtaining the composition of the surface corrosion rather than the nails being analyzed, the nails to be used for this analysis were chosen based on how much rust was present and how well the rust could be removed. Six nails were ultimately selected and cleaned using a mixture of baking soda and water, a stiff-bristled nylon brush, and steel wool. These nails were then placed in clean plastic bags until ready for the analysis. On the day of the analysis, each nail was scrubbed a second time with a clean brush to remove any possible traces of remaining baking soda or steel wool.

A Bruker-Tracer SD III instrument at 40 kilovolts (kV) of energy and a current of 10 micro-amps (μA), without the use of a vacuum, for a 120 second timed assay was used for this analysis. Additionally, a yellow filter (12 mil AL, 1 mil Ti) was used to limit the amount of anomalous background readings obtained. Both the SIPXRF and ARTAX software were used to interpret the resulting spectra and compare it to the spectrum of a modern steel nail.

Artifacts Analyzed

Artifact One – 2017:58:T104:2

Artifact Two – 2017:58: T126:N.Wall Collapse

Artifact Three – 2017:58:T101:1 (wire)

Artifact Four – 2017:58:T101:1 (cut)

Artifact Five – 2017:58:T107:2

Artifact Six – 2017:58:T102:1

Reference Sample

All images taken by Kaleigh Perry

Results

Nail Number	Accession Number	Provenience	Nail Type	Spectrum Color	Composition
Control (Modern Wire Nail)	N/A	Unmarked box of modern nails	1 1/2 inch Wire		Fe; Ar; Ca; Ti; Cr; Mn; Ni; Cu; Zn
1	2017:58:T104:1	Unit A, Level 2	2 1/2 inch Wire		Fe; Ar; K; Ca; Ti; Cr; Mn; Cu; Zn; Ga; As; Sr; Po
2	2017:58:T126: N.Wall Collapse	Unit A, North Wall Collapse	1 7/8 inch Wire		Fe; Ar; K; Ca; Ti; Cr; Mn; Cu; Zn; Ga; As; Sr; Po
3	2017:58:T101:1	Unit B, Level 1	1 5/16 inch Wire		Zn; Fe; Pb; Ar; Ca; Ti; Cr; Mn; Cu; Ta; W; Bi; Ag; Sn
4	2017:58:T101:1	Unit B, Level 1	1 1/4 inch Cut		Fe; Ar; K; Ca; Ti; Nd; Cr; Sm; Cu; Zn; Ga; As; Sr; Po
5	2017:58:T107:2	Unit B, Level 2	1 3/4 inch Cut		Fe; Ar; K; Ca; Ti; Nd; Cr; Sm; Cu; Zn; Ga; As; Sr; Po
6	2017:58:T102:1	Unit C, Level 1	1 3/8 inch Cut		Fe; Ar; K; Ca; Ti; Nd; Cr; Sm; Cu; Zn; Ga; As; Sr; Po

Conclusions

After analyzing and comparing the generated spectra of all seven nails, it has been concluded that, while there are minor differences in the type and amount of trace elements present in the Station Terrace nails verses the modern nail, all of the artifacts analyzed here are composed of steel, rather than wrought iron, much like the modern nail.

Acknowledgements

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