

## Historical Overview

Hugh Ambrose Murrill, Sr. (1868-1931) was a prominent Charlotte businessman of the early 20th century. In 1894, he was one of three founders of the Queen City Printing Company, which he grew over the next 30 years to become one of the the most prominent and successful companies of its type in the state. He was a well-known figure in state Masonic circles, and at one time a grand commander of the Knights Templar, an organization in which many influential and leading Charlotteans of that era were involved. Murrill's wife, Louise Thompson Murrill (1870-1946), was a prominent citizen in her own right; pioneering the Charlotte YWCA and serving as both President of the Charlotte Women's Club and board member of the NC Federation of Women's Clubs, the state branch of the nationwide General Federation of Women's Clubs, founded during the late 19th century Progressive Movement to provide voices to female civic activists, and which still exists today.

Their home at 2122 Roswell Avenue was constructed in 1928 of hollow clay tile and stucco, at a cost of \$13,000.00. According to a newspaper article of the time, it was built with an "Oriental stucco finish in a cream shade." Built concurrently was a two car detached garage, of the same materials, which is still standing. The house maintains many of its original architectural features, including original doors, windows, and flooring, and is still painted in a cream stucco.

Roswell Avenue at that time had been newly developed, and it quickly became a prestigious street, facing what was then the 9 hole golf course of the Myers Park Country Club. Other prominent Charlotteans were also building neighboring homes overlooking the golf course, many of which are still standing, including F.D. Lethco (2038 Roswell Ave, 1928), C.A. Mees (2138 Roswell Ave, 1928), and J.B. Efird (since burned), on land he later donated to the Myers Park Baptist Church. Also constructed during this same time period was the historic Homer Albro House, around the corner at 1943 Queens Rd.

2122 Roswell Avenue, the H. A. Murrill, Sr. House, constructed in 1928 was constructed of hollow clay tile perimeter walls with conventional wood framing for interior walls, floor and roof. (assumed without benefit of de-construction) The exterior finish is stucco with natural slate tile roof with copper gutters. The interior finish of plaster appears to be directly applied to tile at exterior walls.

The nearly square footprint house with two floors has an excavated one third basement and partial finished attic. In Four Square (Prairie style) form with shallow pyramidal hip roof and wide overhangs with decorative corbels. A NE sunroom side addition was built adjacent to driveway with a flat roof. A NW small rear breakfast bay was added in recent years. An accessory two garage near the north corner of house is also built of structural clay tile and visible within and also with a wood frame roof, but in composition shingles.

The interior plan with center stair hall with dining kitchen on left and parlor with study on right and four corner bedrooms upstairs. The original attic stair at rear of upper stairhall was removed to gain a third bathroom.

The house maintains it's strong square form emphasized by the stark plain smooth and continuous walls only punctuated by strategically placed windows. The surface is devoid of texture or detail other than a thick horizontal band at the upper floor window sill. The only decorative ornamentation is the articulated corbels at the eave.

Noted are two designated landmarks of Four Square Architecture.

- 1) Charles W. Parker House circa 1904 at 901 Central Avenue. An early design for Charlotte with use of contrasting materials and horizontal expression and with a band of textured stucco.
- 2) Jake Newell House circa 1911 at 819 Sunnyside Avenue also in the Piedmont Park neighborhood. This example is sided in continuous clapboard without detail other than trim. It also is in conventional wood frame construction and siding.

Noted is a designated landmark of a not commonly used structural finish material.

- 1) The Harry Arthur Ziem House at 1812 East Eight Street in Elizabeth neighborhood. This house shares with the other two examples of the Chicago influence architecture connection; moreover, It also shares another attribute with the H. A. Murrill, Sr. house for the concern and attribute of fire protection.

Structural hollow clay tile “units were a high-technology invention in the nineteenth century and continued to be widely used until the 1950s in the United States”. Advantageous mostly for commercial construction for use of walls, floor-ceiling spans with a multiplicity of shapes and applications; however, that suited the industry with an abundance of labor force until displaced by the “cheap appeal of concrete technology”. The marketing advantages that propelled sales in the beginning and mostly for commercial market and use therefrom was the promotion of being “fireproof”. The trend of the twentieth century market reduced to use for walls and by a few selective homeowner’s demand.

# Structural clay tile

**Structural clay tile** describes a category of burned-clay building materials used to construct roofing, walls, and flooring for structural and non-structural purposes, especially in fireproofing applications. Also called **building tile**, **structural terra cotta**, **hollow tile**, and **clay block**, the material is an extruded clay shape with substantial depth that allows it to be laid in the same manner as other clay or concrete masonry. In North America it was chiefly used during the late 19th and early 20th centuries, reaching peak popularity at the turn of the century and declining around the 1950s. Structural clay tile grew in popularity in the end of the nineteenth-century because it could be constructed faster, was lighter, and required simpler flat falsework than earlier brick vaulting construction.<sup>[1]</sup> Each unit is generally made of clay or terra-cotta with hollow cavities, or cells, inside it. The material is commonly used in floor arches, fireproofing, partition walls, and furring.<sup>[2]</sup> It continues to be used in Europe to build fire-resistant walls and partitions. In North America the material has largely been replaced by concrete masonry units.



Advertisement of hollow structural tile  
*circa* 1920.

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## History, Origins, and Development

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### Pre 1850s-1870s

Clay tile in different capacities has been used for thousands of years. The Romans were among the first to use clay tile in construction by building clay pots to lighten vaulting loads.<sup>[3]</sup> However the first recorded structural use of terra-cotta forms was in sixth-century Italy in the dome of the Church of San Vitale in Ravenna. Clay pots lined with plaster of paris lightened the load of the dome in a similar way to earlier Roman construction.<sup>[2]</sup>

### 1850s-1870s

The first recorded use of structural clay tile in the United States was in 1853. Frederick A. Peterson designed hand-shaped clay ovals that he placed between I-beams and covered with cement to create flooring. Peterson debuted his method in the Cooper Union Building in New York City. However, Peterson's method was not mass-produced or replicated until the 1870s.<sup>[3]</sup> In 1871, Balthasar Kreischer and George H. Johnson patented a new method similar to Peterson's, based on earlier precedents including those of British architect Joseph Bunnett in 1858, as well as designs by Peterson.<sup>[3]</sup> Each of these methods emerged out of a growing need to fireproof buildings following massive fires across the United States during that last quarter of the nineteenth century. Prior to the widespread use structural clay tile, brick and masonry construction dominated fireproofing techniques. However, brick and masonry construction, especially vaulting, was heavy, was time consuming to construct, and required the construction of costly custom formwork.<sup>[3]</sup> Structural clay tile offered a lighter, faster, and simpler alternative. An interlocking system of angular clay tiles that were fit together with a keystone became popular in the early 1870s, after designs by Vincent Garcin were mass produced to create flat segmented arches.<sup>[3]</sup> This flat segmented arch, developed by Garcin, was first used in the United States at the New York Post Office, Kendall Building in Chicago, and the Singer Manufacturing Building in St. Louis, becoming the most prolific use of hollow clay tile until the end of the century.<sup>[3]</sup>

## 1880s-1900s

With its increased popularity, structural clay tile became one of the most popular materials for fireproofing iron and steel construction.<sup>[3]</sup> However, its capacity for fireproofing was not fully realized until Peter Bonnett Wight invented the "tile shoe" in 1881. The "tile shoe" covered the exposed side of metal beams, fully insulating them from fire.<sup>[1]</sup>

## 1910s-1950s

Flat arch construction grew in popularity with the increasing number of buildings using steel and iron structural members in their design. New building code requirements for fireproofing aided in the use and proliferation of structural clay tile in skyscrapers and other large buildings.<sup>[2]</sup> After 1910, manufactures began to test and develop stronger and more complex structural clay tile systems that worked better in compression. Greater compressive strength, found largely in the invention of the end pressure arch, allowed the material to be used in longer floor spans.<sup>[2]</sup> However, as reinforced concrete grew in popularity as a cheaper and less complex alternative, structural clay tile use in floors and roofing declined. Increasingly, clay tile was used inside concrete flooring to make it lighter, or as centering/formwork for concrete construction.<sup>[3][2]</sup> With the rise of reinforced concrete flooring and metal decking, structural clay tile fell out of popularity for use in horizontal applications.<sup>[2]</sup> While the use of structural clay tile in flooring and roofing declined, its use in walls enjoyed popularity into the 1950s.<sup>[3]</sup> Wall tile blocks continue to be manufactured, but specialty tile units often require custom commissions.<sup>[2]</sup> Clay tile arches are no longer manufactured and due to a lack of skilled artisans to lay the arch systems, they are never replaced.<sup>[2]</sup>

*An example of a typical NATCO hollow clay tile as advertised in their 1910 catalogue. "The visible points of superiority, as compared with similar tile of different makes, are the deep dovetail scoring for the better bonding of stucco or plaster, the absence of imperfections and the better general symmetry due to the more accurate machining by this company's unequaled equipment. Equally important qualities not obtainable in other tile are not so apparent to the eye. These consist of finer properties in the raw clay and its more uniform and thorough burning, resulting in greater density and a higher degree of inherent strength. It is to certify these advantages, and to instantly identify the tile possessing them, that the name NATCO is stamped plainly upon the face of each tile." —From NATCO Catalog "Fireproof Construction for Houses and Other Buildings at Moderate Cost," 1910.*

## Horizontal Application

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### Tile Floor Arch Types

## Side Pressure Arch Construction

Side pressure arch construction, the first method used in tile floor arches, is composed of hollow tiles laid parallel to I beams.<sup>[3]</sup>

## End Pressure Arch Construction

End pressure arch construction is composed of hollow tiles laid perpendicular to I beams. This method enjoyed popularity after it was discovered to be fifty percent more efficient than side pressure arches.<sup>[2][3]</sup>

## Book Tile

A popular use of structural clay tile was book tile, a flat hollow tile, that was used in roofing systems. Book tile was also used in raised flooring to allow plumbing and other systems to be run in buildings.<sup>[3]</sup>

## Composite Construction

In the late 1890s, the most popular system of tile floor arches combined both side and end pressure construction. However, with the increase in popularity of concrete construction, composite construction began to use both methods in conjunction with reinforced concrete. Later systems used clay tiles and reinforced concrete to replace tile floor arches in the 1930s.<sup>[2]</sup>

## Vertical Application

The most popular and enduring form of structural clay tile is its use in vertical applications as a structural element. In the vertical application, structural clay tile blocks are used in both columns and load bearing walls. Likewise, structural clay tile blocks were frequently used as backing for exterior walls, often filling the voids behind architectural ornament, stone, or brickwork.<sup>[2]</sup> In early steel construction, clay tile blocks were historically used as infill between structural members, which provided much needed lateral support.<sup>[2]</sup> In some cases, entire walls—typically in single-story buildings, seldom higher—were created out of structural clay tile, typically multiple wythes thick.<sup>[2]</sup> The cells of these blocks could be either unfilled or filled with reinforcing and grout.<sup>[2]</sup>

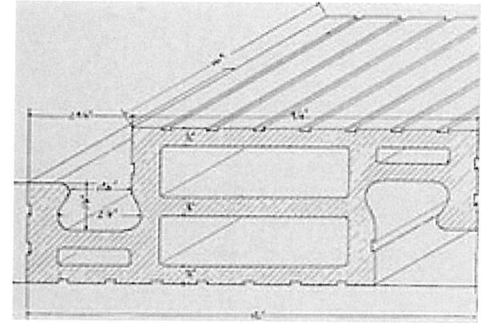
Electrical wiring being installed in structural clay tile block used for interior partitions in the vertical application, 2008.

## Specialty Types



## Structural Glazed Facing Tiles

Structural glazed facing tile is perhaps its most common and prolific form of clay tile block. Structural glazed facing tile has been extensively used in institutional settings where a durable, easily cleanable surface is desired. The material is commonly found in schools, correctional facilities, swimming pools and similar facilities. A wide variety of shapes have been developed to allow the construction of corners, caps, wall base and other elements using standard sizes. SGFT cannot be easily cut without damage to the glazed surface, so several dozen special shapes are available to allow most situations to be accommodated. SGFT features a fired glazed surface that may be produced in colors similar to those available from standard ceramic tile.<sup>[4]</sup> SGFT has been replaced in some applications by glazed masonry units, a composite of concrete masonry and a tile-like surface coating.



An example of a specialty type of hollow clay tile unit. This example interlocked with other units to increase strength, *circa 1905*.

Specialized kinds of structural clay tile were produced with a vitrified or glazed curved surface for use in building farm silos. Other shapes, called "telephone tiles", were used as underground multi-celled conduits for telephone cables.<sup>[5]</sup>

## Manufacturing and Classification

### Manufacturing

Structural clay tile is still manufactured according to historical processes: clay is kneaded to an appropriate consistency, pressed into molds, and fired in large kilns.<sup>[2]</sup> Different molds and forms are used for each type and shape of structural clay tile.

### Classification

Structural clay tile is classified into three grades: hard, semi-porous, and porous. Each classification is differentiated by the length of time the tile is fired during the manufacturing process, and each classification is used for different purposes.<sup>[2]</sup>

Hard tile has the greatest structural strength of the three categories, and is used largely in applications where it is exposed to the elements. Its hardness resists moisture, as it is less porous than other classifications. However, hard tile is less fireproof as it is prone to cracking in high heat.<sup>[2]</sup>

Semi-porous tile has moderate strength and is resistant to moisture.



Porous tile is made by mixing clay with straw, sawdust or other materials that are burned out during the manufacturing process making it highly porous and lighter, in addition to reducing structural dead loads. Porous tile was preferred among builders for fireproofing since it behaved well in high heat.<sup>[2]</sup>

Tile is classified into load-bearing and non-load-bearing categories. Load-bearing tile is described under ASTM Standard C34, subdivided into grade LBX, for areas exposed to weathering, and LB, for protected applications. Non-load-bearing tile is described under ASTM C56 in one grade, NB. It is used for interior partitions, and may be laid with cells running horizontally or vertically. Tile may be ribbed to accept a plaster finish, or smooth. Special shapes were available to attach to and to fit around structural steel shapes, providing a fire-resistant enclosure for the load-bearing steel members.<sup>[4][6]</sup>

Structural clay tiles are manufactured in a variety of standard sizes, including 4 inches (10 cm), 6 inches (15 cm), 8 inches (20 cm), 10 inches (25 cm) and 12 inches (30 cm) thicknesses, and typically 12 inches (30 cm) x 12 inches (30 cm) or 12 inches (30 cm) x 8 inches (20 cm) face dimensions.<sup>[4]</sup> Tile was also manufactured in a series of graduated wedge shapes for installation between steel members as a fireproof flat arch floor structure, to be covered with a concrete wearing surface above. In other cases, structural clay tile was used as a permanent form material to reduce the bulk and weight of structural concrete floor slabs.<sup>[7]</sup>

## See also

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- Terra cotta
- Gypsum block
- Architectural terracotta
- Reinforced concrete

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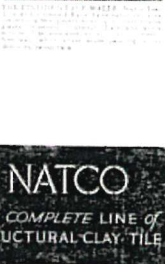
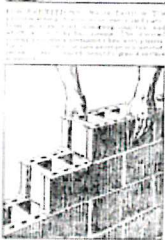
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**YOU  
SHOULD  
KNOW  
SO YOU CAN  
INTELLIGENTLY  
PLAN TO BUILD**



Natco Structural Clay Tile (formerly called "hollow tile") is a building material used alone, or in combination with other materials, for walls, floors, and fire proofing. The units are moulded from special clay into scientifically designed shapes that give maximum strength with minimum weight, then burned in great kilns to the density and durability of rock.

The advantages of Natco Structural Clay Tile are numerous and outstanding. The rugged strength of the tile enables it to dependably bear heavy burdens, while its design, which eliminates all unnecessary material, effects considerable savings in dead load, and so in frame and foundation costs. The dead air cells in the tile insulate the structure against the passage of heat and cold, making it warmer in winter, cooler in summer. The size of the units, and their ease of handling, speed erection, and save labor and mortar costs. The permanence and durability of the tile cut upkeep and repairs.

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News Article - Charlotte Observer (published as Charlotte Sunday Observer) - April 22, 1928 - page 59

April 22, 1928 | Charlotte Observer (published as Charlotte Sunday Observer) | Charlotte, North Carolina | Page 59

## BUILDING NEW HOME FOR MURRILL IN MYERS PARK

The Home Real Estate and Guar-  
anty company is building a home  
in Myers Park for H. A. Murrill, Sr.  
It will be constructed of hollow tile  
and stucco, it was learned yester-  
day.

CITATION (AGLC STYLE)

*Charlotte Observer*(online), 22 Apr 1928 59 <<https://infoweb-newsbank-com.proxy141.nclive.org/apps/news/document-view?p=AMNEWS&docref=image/v2:11260DC9BB798E30@EANX-NB-14D5B83CF7CCA7EC@2425359-14D5B6A2EBEDE324@58-14D5B6A2EBEDE324@>>

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News Article - Charlotte Observer (published as The Charlotte Observer) - December 20, 1928 - page 17

December 20, 1928 | Charlotte Observer (published as The Charlotte Observer) | Charlotte, North Carolina | Page 17

**Mrs. James M. Oates and daughter, Miss Alma Oates, of Baltimore, will arrive in the city Saturday morning to spend the holidays with Mrs. Oates' son, Mr. James M. Oates, Jr., and family, at their new home in Eastover. Miss Louise Oates, who is a professor at the University of Virginia, and Lieutenant Commander Eugene Oates, will spend the holidays with Mr. and Mrs. H. A. Murrill, at their home on Roswell avenue. Miss Oates and Lieutenant Oates are niece and nephew of Mrs. Murrill.**

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**CITATION (AGLC STYLE)**

*Charlotte Observer*(online), 20 Dec 1928 17 <<https://infoweb-newsbank-com.proxy141.nclive.org/apps/news/document-view?p=AMNEWS&docref=image/v2:11260DC9BB798E30@EANX-NB-14F14E546E97F8EC@2425601-14F110B182D0CF76@16-14F110B182D0CF76@>>

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News Article - Charlotte Observer (published as The Charlotte Observer) -  
May 23, 1928 - page 6

May 23, 1928 | Charlotte Observer (published as The Charlotte Observer) | Charlotte, North Carolina | Page 6

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**Home Real Estate & Guar-  
anty Co. are progressing nice-  
ly with the Murrill residence  
on Roswell Avenue. They  
started plastering Monday. This  
is a stucco job and will be fin-  
ished with ORIENTAL Stucco  
Finish in a cream shade.**

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*Charlotte Observer* (online), 23 May 1928 6 <<https://infoweb-newsbank-com.proxy141.nclive.org/apps/news/document-view?p=AMNEWS&docref=image/v2:11260DC9BB798E30@EANX-NB-14D5B272F01C6D5A@2425390-14D41AE05C71A0B1@5-14D41AE05C71A0B1@>>

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# NEW HOMES FOR MANY IN CITY

Some Buying and Some Building Handsome Dwellings in Charlotte.

Many Charlotte people have either bought or built homes in various parts of the city during the past several months, according to information received from a number of Charlotte's real estate men.

Among homes which are being built is one in Eastover for J. Norman Pease of the Lockwood Greens Company. A house is under construction, too, for Hugh Murrill, Sr., on Roswell avenue. Plans have been made and it is announced that work will begin at once on a new home for Irving Henderson.

One of the homes recently completed is that for Archie Taylor, of the Big Boy Bottling company. This is located on Malvin road.

Thomas Ruth is announced as purchaser of a new home on Briarwood road while C. P. Wanzer has also purchased a house on Briarwood road. This house was formerly owned by Mr. Lee, engineer with the Duke Power company, who some time ago went to Durham. Other buyers of homes on Briarwood road are J. H. Bryant and J. H. Frye.

CITATION (AGLC STYLE)

Charlotte Observer(online), 8 Apr 1928 57 <<https://infoweb-newsbank-com.proxy141.nclive.org/apps/news/document-view?p=AMNEWS&docref=image/v2:11260DC9BB798E30@EANX-NB-14D5B81BD7612D1C@2425345-14D5B2F208BCC455@56-14D5B2F208BCC455@>>

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