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# High and Mighty: A Comparative Analysis of the Wood-Framed Steeples of John McArthur, Jr.

## Abstract

In order to understand this early period of John McArthur, Jr.'s career, this thesis examines the ideological principles, architectural professionalism and influences, and structural experimentation and performance of two remarkably tall wood-framed steeples designed by McArthur. Understanding these steeple designs perhaps sheds light on what compelled him, later in his career, to repeatedly set out to design structures that would be the highest in their cities or country. John McArthur, Jr.'s designs for the steeples of two Presbyterian churches, while they were stylistically representative of many churches of the Round-Arched style built during that period, they were remarkably high. Their unusual height, particularly Tenth Presbyterian in Philadelphia, rearing up to 248 feet, is the result of a confluence of factors. They represent the result of competition among ambitious church congregations, competition among architects in an emerging profession, and McArthur's own structural confidence. Through this comparative analysis, a picture of McArthur at this early period of his career emerges. McArthur designed these very tall wood-framed structures by applying his knowledge of materials gained from a decade working in the carpentry trade. Combined with his knowledge of wood and carpentry, McArthur also applied intuition, creating structures that were experimental in multiple ways, ultimately leading him to utilize an internal armature framing system. This system had consequences, both good and bad, for the performance and outcomes of both steeples. This thesis serves to provide a clearer comprehension of McArthur's wood-framed steeples in the context of mid-nineteenth century steeple design and construction.

## Keywords

spire, Presbyterian church, round arched style, rundbogenstil armature frame

## Disciplines

Historic Preservation and Conservation

## Comments

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HIGH AND MIGHTY:

A COMPARATIVE ANALYSIS OF THE WOOD-FRAMED STEEPLES OF JOHN McARTHUR, JR.

Holly Anne Boyer, AIA

A THESIS

in

Historic Preservation

Presented to the Faculties of the University of Pennsylvania

in

Partial Fulfillment of the Requirements for the

Degree of Master of Design in Historic Preservation

2019

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*To the memory of my dear friends,  
without whom, I could not have become an architect,*

*Arthur A. Ovaska (1951-2018)*

*and*

*Timothy R. Cronin (1969-2018)*



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My longest-standing debt is to Penelope S. Watson and Michael C. Henry, who first introduced me to the discipline of preservation when I was still a teenager, under their employ during breaks from my undergraduate studies. By observing them in their professional practice I learned the things that have served me best in my professional career: careful problem solving, remembering that much can be learned from builders of the past and present, and, above all else, to treat historic buildings with the care and respect they deserve.

I owe a special thank you to my advisors: Aaron Wunsch and Michael C. Henry (who gets double the credit here) for all of their insight and advice, and Frank Matero for overarching guidance along the way. Aaron generously agreed to act as my advisor, understanding that I am an architect with the writing skills that implies, and has carefully guided me in the process of becoming ever-so-slightly more like an historian.

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## Introduction

An instinctive taste teaches men to build their churches in flat countries with spire-steeples, which... point, as with silent finger, to the sky and stars, and sometimes, when they reflect the brazen light of a rich though rainy sun-set, appear like a pyramid of flame burning heavenward.

Samuel Taylor Coleridge  
"Letter I," *Satyrae's Letters* (1817)

The nineteenth-century cityscape was defined by its church steeples, those towers that rose above the roofs of the crowded and busy city below and gave so many skylines their character. In the early 1850s, young Philadelphia architect John McArthur, Jr. (Fig. 1), was engaged in several ecclesiastical commissions, resulting in the construction of two steeples that towered over their respective cities. Was it, in fact, "instinctive taste" that taught architects like McArthur to build their churches and steeples? Or were steeples, along with the churches they surmounted, the result of a complex set of influences on architects and builders of the time? And what can steeples of the nineteenth-century cityscape tell us about their designers and the social context in which they emerged? Through a comparative analysis of McArthur's two steeples, this thesis explores the intersections of the ideological principles, nascent professionalism, and structural experimentation that characterized this moment in McArthur's career.

John McArthur Jr., primarily remembered for his design of Philadelphia City Hall, was in fact broadly important in Philadelphia's nineteenth-century history. Though, as architectural historian Lawrence Wodehouse observed, any architect would be satisfied to be remembered for a building as significant, in its context, as Philadelphia City Hall.<sup>1</sup> But long before securing the

---

<sup>1</sup> Lawrence Wodehouse, "John McArthur, Jr. (1823-1890), *Journal of the Society of Architectural Historians*, Vol. 28, No. 4 (December 1969), 283.

commission for City Hall, McArthur also designed some of the city's most ambitious buildings of the mid-nineteenth century. Some of his most notable included the Public Ledger Building and the Post Office and Federal Building, neither of which survive. According to architectural historian George Tatum, by the mid-1850s, which was very early in McArthur's career, he had already emerged as "Philadelphia's principal architect of hotels."<sup>2</sup> Even in articles published during McArthur's lifetime, his significance as an architect was noted – an 1870s article stated that "John McArthur was [to Philadelphians] a sort of oracle in regard to building..."<sup>3</sup> Several decades after McArthur's death, his memory had not begun to fade, as historian Joseph Jackson distinguished him with the title of "the last of Philadelphia's early architects."<sup>4</sup>

During his career, which spanned just over four decades, McArthur was prolific. In addition to his large public buildings, McArthur's repertoire spanned a vast array of building types including commercial and industrial buildings, residences, ecclesiastical buildings, hotels, banks, prisons, educational buildings, and twenty-four army hospitals during the Civil War. For all of his productivity, however, McArthur was not an author; the written record of his career is limited to surviving specifications and business correspondence. There is also no repository of his papers, and his drawings that survive are sparse and are held by multiple archives, presenting significant research challenges. Other historians have dealt with this problem by drawing from a wide range of sparse records, and relying largely upon periodicals, competition records, and the National Archives for his government work. Nonetheless, people have studied McArthur in limited contexts. McArthur's professional life, including his architectural education,

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<sup>2</sup> George B. Tatum, *Penn's Great Town: 250 Years of Philadelphia Architecture Illustrated in Prints and Drawings*. 2nd. ed. (Philadelphia: University of Pennsylvania Press, 1961), 98.

<sup>3</sup> Wodehouse, 271.

<sup>4</sup> Joseph Jackson, *Early Philadelphia Architects and Engineers* (Philadelphia, PA: [s.n.], 1923), 268.

his roles in professional organizations, and his initiatives toward architectural education have been examined by historians George Champlin Mason and Jefferey Cohen.<sup>5</sup> Historians Cohen and Michael J. Lewis have touched upon McArthur's early partnership with German architect Edward Collins.<sup>6</sup> In the 1960s, architectural historians Lawrence Wodehouse, and to a lesser extent, Tatum, cataloged and assessed McArthur's designs, placing them in the broader context of other mid-nineteenth century architects.<sup>7</sup> Lewis has studied in depth the saga of McArthur's competition for and execution of the commission for the Philadelphia Public Buildings, or City Hall.<sup>8</sup> Most recently, historian Roger Moss included McArthur's Tenth Presbyterian in his broad survey of ecclesiastical buildings of Philadelphia.<sup>9</sup> But in all of this research, there has neither been a focus on his body of ecclesiastical work, nor on his timber-framed structures, which remain an important and underexplored part of his eminent career.

McArthur's designs of these steepled churches happened at a time when steeples, as a building element, were very important as an ubiquitous part of the cityscape and of Victorian culture. The list of authors and poets that wrote of steeples and spires, both metaphorically and literally, reads like a who's-who list of nineteenth-century literature – Nathaniel Hawthorne, Ralph Waldo Emerson, Charles Dickens, Emily Dickinson, Alfred Lord Tennyson, Walt Whitman, Henry David Thoreau, and Mark Twain, among others. Steeples were familiar; and at the same

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<sup>5</sup> Mason, George Champlin. "Professional Ancestry of the Philadelphia Chapter." *Journal of the American Institute of Architects* 1 (September 1913), 371-386; Jeffrey A. Cohen, "Building a Discipline: Early Institutional Settings for Architectural Education in Philadelphia, 1804-1890," *Journal of the Society of Architectural Historians*, Vol. 53, No. 2 (June 1994), 165; Michael J. Lewis, *Dauer und Weschel: Festschrift für Harold Hammer-Schenk zum 60*, ed. Xenia Riemann (Berlin: Lukas, 2004), 130-133.

<sup>6</sup> Cohen, 139-183.

<sup>7</sup> Wodehouse, 271-283; Tatum, 39-126.

<sup>8</sup> Lewis, Michael J. "'Silent, weird, beautiful': Philadelphia City Hall." *Nineteenth century (Victorian Society in America)*, 1992, Vol.11(3-4), p.12-21.

<sup>9</sup> Roger W. Moss and Tom Crane, *Historic Sacred Places of Philadelphia*, (Philadelphia: University of Pennsylvania Press, 2005), 178-181.

time they were magical. Steeples had the metaphorical power to connect earthly humans with the spiritual world above. Steeples were signs of civilization, markers on the horizon, set against backdrops of brilliant sunsets, or of smoke billowing from factories of the new industrial era. And to some, like Hans Christian Andersen, steeples were a practical unit of measure, familiar to even the simplest schoolchild, through which he could convey the otherwise unfathomable depth of the sea.<sup>10</sup>

In addition to the important roles that steeples played in nineteenth-century culture, they also hold the potential to capture many significant things taking place at that time. They carried with them crucial implications for both the congregations that built them, and the architects who designed them. The religious revivals of the nineteenth-century resulted in fierce competition between churches, vying for new converts to fill their pews. Evangelical sects, each competing for souls, used any means necessary, ranging from fiery preaching to impressive church edifices. An imposing steeple and spire could grab the attention of would-be churchgoers from miles around. With increased church membership came increased revenue and the resultant proliferation of church buildings. Waves of church building commissions came with the waves of the religious revivals, with McArthur's steepled churches springing from the Third Great Awakening. The multitude of church building commissions, particularly those with impressive steeples and spires, afforded architects opportunities to showcase their architectural and structural prowess. In this period we observe architects, such as Samuel Sloan, pleased with themselves over the "considerable degree of attention" they received for the design of a

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<sup>10</sup> Hans Christian Andersen, *The Little Mermaid, and Other Stories* (London: Lawrence and Bullen, 1893), 1.

steeple.<sup>11</sup> And at the same time we witness John McArthur, Jr., in his design of the steeple of Tenth Presbyterian, silently accomplish the tallest structure in Philadelphia. A competition, spoken or unspoken, was indeed afoot.

In order to study the complexities of steeples, one first has to understand their historical, ideological and design contexts, the architectural tastes and styles that influenced them externally, and the engineering of their internal structures. Chapter 1 provides an overview of the historical background of John McArthur, Jr. and the development of his architectural career. It traces McArthur's path to becoming a professional architect, like many others of the era, beginning with his carpentry apprenticeship, and following him through training at mechanics institutes and projects as a construction foreman. A picture of McArthur as a hand-on mechanic, with intimate knowledge of the materials he was designing with, emerges and informs our understanding of his approach to structures throughout his career. In this chapter, influences on McArthur during his early career are identified to include his short-lived partnership with a German architect, and architectural pattern books of the period. Through his commissions, including those for the subject churches, as well as his participation in the burgeoning American Institute of Architects, McArthur's career forms in tandem with the professionalization of the field as a whole.

Chapter 2 explores the ideological context of steeples, specifically as the highest structures in their environments. It provides an overview of McArthur's two steepled churches, both the highest structures in their cities at the time of their construction. This chapter asks the questions: Why were McArthur and his contemporaries compelled to construct increasingly high

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<sup>11</sup> Samuel Sloan, *Sloan's Constructive Architecture; A Guide to the Practical Builder and Mechanic* (Philadelphia, PA: J.B. Lippincott & Co., 1866), 54.

structures? Why would church congregations assume such great liabilities with the construction of such high structures? How did congregations reconcile these extravagant constructs with their piety? Answers to these questions are explored within the ideologies of evangelical religion, and within the competitions between both religious sects and architects alike.

Chapters 3 and 4 address the architectural context of McArthur's early ecclesiastical commissions, establishing the larger design context, and providing an analysis of the design influences that resulted in the two steepled churches. Chapter 3 expands on the influence of his early partner, German-trained architect Edward Collins – and traces the transformation of the German *Rundbogenstil* as it becomes the foundation of the American Round-Arched style. The incorporation of Gothic-inspired steeples on buildings that are, at their core, Romanesque-inspired, is explored as a major feature of this American adaptation. Chapter 4 attempts to establish the design influences that resulted in McArthur's steepled churches by comparing their designs against both seminal buildings of the *Rundbogenstil*, and published designs of McArthur's contemporaries, particularly his competitor in Philadelphia, architect Samuel Sloan.

Finally, Chapter 5 looks inside the structure of the steeple, to examine what cannot be seen from the architectural exterior. The discussion attempts to provide an overview of the basic concepts of timber-framing and of the types of structural systems that were employed during the mid-nineteenth century. McArthur's structural system, perhaps by virtue of the sparseness of comparisons, appears to be atypical. McArthur's framing system is experimental in multiple ways, which is typical for this era. And, as we find, some of his experiments had both positive and negative effects on the long-term performance and survival of his steeples.

The seeds of this project were sown in the mid-1990s when I had the privilege to work, under the esteemed preservation firm of Watson & Henry Associates (W&HA), on the

documentation and restoration of McArthur's steeple of First Presbyterian in Salem, New Jersey. During the project, W&HA documented McArthur's internal armature framing system and identified "the potential significance of the steeple structural configuration."<sup>12</sup> Understanding the potential significance of the structure, and later realizing that the steeple shared McArthur's drawing board with Tenth Presbyterian, sparked my interest in understanding the relationship between his two designs. Over two decades later, the flame of that interest had only grown and formed the basis for this exploration.

### **The Subject Church Buildings**

This thesis focuses on two church buildings (Fig. 2), both designed by John McArthur, Jr.:

"Tenth Presbyterian"

West Spruce Street Presbyterian Church later the Tenth Presbyterian Church (after 1895)  
17<sup>th</sup> & Spruce Streets

Philadelphia, Pennsylvania

Designed: January 1852 – May 1854

Constructed: April 1855 – January 1857

"First Presbyterian"

First Presbyterian Church

88 Market Street

Salem, New Jersey

Designed: July 1853 – July 1854

Constructed: July 1854 – October 1856

The present Tenth Presbyterian Church is the result of an 1895 merger between the parent congregation (Tenth Presbyterian Church) and the colony, or offshoot, congregation (West Spruce Street Presbyterian Church), through which the congregation took the building of the West Spruce Street Church and the name of the Tenth Church.<sup>13</sup> Because of this change in

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<sup>12</sup> Watson & Henry Associates, *Steeple Assessment Report for First Presbyterian Church of Salem* (Bridgeton, NJ: Watson & Henry Associates, 1996), 1.

<sup>13</sup> The Tenth Presbyterian Church in Philadelphia, *The One Hundreth [sic.] Anniversary of the Tenth Presbyterian Church in Philadelphia* (Philadelphia, PA: Tenth Presbyterian Church, 1929), xxi.

names, and for the sake of clarity, throughout the remainder of this text the two churches will be referred to as “Tenth Presbyterian” and “First Presbyterian.”



## Chapter 1: Historical Background

On May 13, 1823, in Bladenock [Bladnoch], a small village on the River Bladnoch in the southern lowlands of Scotland, John McArthur, Jr. was the firstborn to his parents James and Agnes.<sup>1</sup> John was designated as *Junior*, in keeping with nineteenth century norms, to differentiate him from his uncle of the same name, a master builder. Around the time of John Jr.'s birth - 3,300 miles away in America - several other things were being born: the Franklin Institute, an institution founded in 1824 for the promotion of the Mechanic Arts, with its vocational drawing school; and the newly forming congregations of the Tenth Presbyterian Church of Philadelphia and the First Presbyterian Church of Salem, New Jersey.

By the early 1830s, the McArthur family had grown to include six children (a seventh being born later in Philadelphia), and they made the decision to emigrate to the United States, probably in the interest of future opportunities for their large family.<sup>2</sup> Philadelphia had a longstanding history of Scottish immigration, particularly from the heavily Protestant lowland region, due to the city's foundation of religious tolerance. James McArthur left for the new world ahead of his family to secure housing in anticipation of their arrival. In 1834, John Jr. embarked on the passenger ship *Ajar* with his mother and five younger siblings in tow.<sup>3</sup> Awaiting him on the other side of the journey was Philadelphia, typical of American cities with their vast opportunities and burgeoning ideas of egalitarianism that permeated economics, politics, and

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<sup>1</sup> "John McArthur Jr.," Laurel Hill Cemetery Records, 2019, <https://thelaurelhillcemetery.org/research/cemetery-records>.

<sup>2</sup> Ibid.

<sup>3</sup> Ship Manifest for Passenger Ship *Ajar*, January 1, 1830 [1834], Ellis Island Passenger Records, The Statue of Liberty – Ellis Island Foundation, Inc., <https://www.libertyellisfoundation.org/passenger-details/czoxMzoiOTAxMjl4ODkzOTIzOC17/czo5OiJwYXNzZW5nZXliOw==>.

religion.<sup>4</sup> The economic expansion and populist movements of the early nineteenth-century made dreams of artistic freedom and financial success seem within reach for American artists and architects, and was perhaps what propelled John McArthur, Jr. into his career as an American architect.<sup>5</sup> It is certainly this idea that architecture was within reach of men from every walk of life, no longer limited to gentlemen, that prompted the Carpenter's Company to start its vocational drawing school in 1833.<sup>6</sup>

Within a few years of the McArthur family's arrival in Philadelphia, he was now old enough for a carpentry apprenticeship. At the same time, his uncle John (Fig. 3), who had previously emigrated from Scotland, was establishing himself as a master carpenter seems to have been willing to accept his namesake as an apprentice.<sup>7</sup> This relationship became the foundation of multiple collaborations between the uncle and nephew in the ensuing decades. During his apprenticeship, John Jr. developed aspirations to extend his knowledge beyond the craft of carpentry and toward the nascent profession of architecture. Despite his uncle John's offer to sponsor his "liberal," or formal, education, John Jr. opted to continue to work at carpentry during the day while taking drawing classes and lectures in the evenings.<sup>8</sup> While there is little documentation of the particulars of his architectural education, evidence suggests that as a teenager he attended lectures by leading local architect, Thomas Ustick Walter at the Franklin Institute and studied drawing and design at the Architectural Drawing School of the

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<sup>4</sup> Mary N. Woods, *From Craft to Profession: The Practice of Architecture in Nineteenth-Century America* (Los Angeles, CA: University of California Press, 1999), 27-28.

<sup>5</sup> *Ibid*, 82.

<sup>6</sup> Jeffrey A. Cohen, "Building a Discipline: Early Institutional Settings for Architectural Education in Philadelphia, 1804-1890," *Journal of the Society of Architectural Historians*, Vol. 53, No. 2 (June 1994): 140.

<sup>7</sup> *Ibid*, 150.

<sup>8</sup> *Makers of Philadelphia; An Historical Work*, ed. Charles Morris (Philadelphia, PA: L.R. Hamersly & Co., 1894), 210.

Carpenters' Company.<sup>9</sup> McArthur's architectural education derived from a combination of craft apprenticeship, drawing school, and mechanics' institutes and is emblematic of the training that prevailed before the advent of formal architectural education in the United States.<sup>10</sup>

By his mid-20s, McArthur had been working as a carpenter for about a decade and finally launched his career as an architect. His hands-on training as a carpenter certainly made him intimate with the capabilities of wood and joinery – a skill which he would soon employ in his designs of the wood-framed steeples of Tenth and First Presbyterian. His architecture career got its first boost with the 1848 award of a large contract for his design for the House of Refuge for Colored Children, for which McArthur also acted as general contractor.<sup>11</sup> This undertaking helped him open an office in the Washington Square neighborhood, at which point he began identifying himself exclusively as an architect.<sup>12</sup> After completing work on the House of Refuge, McArthur took a similar contract as construction foreman under his uncle for the west wing of the Pennsylvania Hospital.<sup>13</sup> McArthur's management of these large construction projects was a common practice among contemporary architects and illustrates how in the period before the Civil War, leading architects, many former craftsmen, worked as builders to supplement their professional income from design.<sup>14</sup> While working for his uncle, McArthur was hailed as “a young and ingenious architect of our city” in the *Journal of the Franklin Institute* for his design of a truss girder (Fig. 4).<sup>15</sup> In these early years of his career, it is clear that McArthur shifted fluidly

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<sup>9</sup> Cohen, 150.

<sup>10</sup> Woods, 53.

<sup>11</sup> Joseph Jackson, *Early Philadelphia Architects and Engineers* (Philadelphia, PA: [s.n.], 1923), 255.

<sup>12</sup> *Ibid*, 255.

<sup>13</sup> *Makers of Philadelphia*, ed. Morris, 210.

<sup>14</sup> Woods, 94.

<sup>15</sup> “A New Truss Girder,” *Journal of the Franklin Institute, of the State of Pennsylvania, for the Promotion of the Mechanic Arts; Devoted to Mechanical and Physical Science, Civil Engineering, the Arts*

between roles as a designer, construction foreman, and engineer. And like the architecture profession as a whole in the nineteenth-century, McArthur's career was emerging from combined disciplines ranging from carpentry to "building mechanics."<sup>16</sup> Such career moves at this time were common, but, as historian Jeffrey Cohen observes, since the beginning of the nineteenth-century, the fields of construction and architectural design were growing more distinct and separate.<sup>17</sup>

During the early years of his practice, McArthur was joined by the young formally-trained German architect, Edward Collins, who had immigrated to the United States in the midst of the political unrest associated with the German Revolutions of 1848-49.<sup>18</sup> Collins choice of Philadelphia, and his partnership with McArthur, was likely facilitated by their mutual connections with their instructors, Carl Ludwig Thierry and Theodore Thierry.<sup>19</sup> It appears that the partnership between the two began shortly after Collins arrival in the New World, and continued into the early 1850s.<sup>20</sup> During this time, Collins introduced McArthur to the German *Rundbogenstil*, or round-arched style of architecture, which is evident in the ecclesiastical designs emerging from their office at that time.<sup>21</sup> Based on the timing of this architectural partnership, it is almost certainly the case that Collins had a hand in the designs for Tenth

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and Manufactures, and the Recording of American and Other Patent Inventions (1828-1851) Vol. 17, no. 1, (January 1, 1849): 16.

<sup>16</sup> Woods, 4.

<sup>17</sup> Cohen, 168.

<sup>18</sup> Sandra L. Tatman, "Collins, Edward (1821-1902) Architect," Philadelphia Architects and Buildings, [https://www.philadelphiabuildings.org/pab/app/ar\\_display.cfm/23013](https://www.philadelphiabuildings.org/pab/app/ar_display.cfm/23013).

<sup>19</sup> Michael J. Lewis, *Dauer und Weschel: Festschrift für Harold Hammer-Schenk zum 60*, ed. Xenia Riemann (Berlin: Lukas, 2004), 131.

<sup>20</sup> Cohen, 165.

<sup>21</sup> Michael J. Lewis, correspondence to author, April 13, 2019.

Presbyterian. While their partnership was short-lived, it was nonetheless impactful to McArthur, permeating his designs throughout the early decades of his career.

At the same time that McArthur was being exposed to the influences of formally-trained European architects, such as Collins, he was also exposed to the vast influences of pattern books that flooded the profession. Pattern books ... were well of a century old in America, dating back to the early-18<sup>th</sup>-century. But with their growing popularity, architectural books were swelling in numbers with each decade, peaking with 93 new books becoming available in the 1850s.<sup>22</sup> McArthur, like his contemporaries, was not immune to the influence of these architectural books for inspiration. The 1850s was a period during which architects freely exchanged architectural ideas, with the critique of whether pattern books helped or hindered the architecture profession not emerging until the 1860s.<sup>23</sup> In late 1852 and 1853, when the congregations of the Tenth and First Presbyterian Churches respectively commissioned McArthur to design their new church buildings, he only had to look as far as the latest pattern books to find inspiration to adapt for his own designs.<sup>24 25</sup> The most obvious sources of his inspiration were Samuel Sloan's design for a "village church," and the officially sanctioned designs in the *Book of Plans for Churches and Parsonages*, issued by the General Congregational (Reformed Protestant) Convention of 1852.<sup>26</sup>

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<sup>22</sup> Dell Upton, "Pattern Books and Professionalism: Aspects of the Transformation of Domestic Architecture in America, 1800-1860," *Winterthur Portfolio*, Vol. 19, No. 2/3 (Summer - Autumn, 1984), 108.

<sup>23</sup> Woods, 85.

<sup>24</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, Philadelphia, Pennsylvania, 1857-1894, Papers of the Tenth Presbyterian Church, Philadelphia, PA.

<sup>25</sup> Quinton Gibbon M.D., *History of the "First Presbyterian Church" of Salem. N.J.* (Salem, NJ: Session of the First Presbyterian Church of Salem, N.J., 1889), 15.

<sup>26</sup> Samuel Sloan, *The Model Architect: A Series of Original Designs for Cottages, Villas, Suburban Residences, etc. Accompanied by Explanations, Specifications, Estimates and Elaborate Details Prepared Expressly for the Use of Projectors and Artisans Throughout the United States* (Philadelphia, PA: E.S. Jones

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In 1852, the Third Great Awakening was in full swing within the Reformed Protestant sects, including Presbyterian, Baptist, and Unitarian churches. The religious revival and the resultant overcrowding in churches was prompting many congregations to construct new or larger church buildings. It was this growth in church construction that resulted in multiple commissions for McArthur. By the summer of 1853, it appears that the young architect had his hands full with the designs for both Tenth and First Presbyterian on his drafting table, and a third church building, the Wylie Memorial Church, under construction.<sup>27</sup> When the drawings for Tenth Presbyterian were complete, construction was delayed by an economic crisis in Philadelphia caused by the Act of Consolidation of 1854. Although the design for First Presbyterian began later, it went into construction first, with the cornerstone being laid on July 17, 1854,<sup>28</sup> but construction was protracted due to the congregations decision to add a steeple to the design. When the economic crisis in Philadelphia relented, the Tenth Presbyterian congregation proceeded with construction, awarding the contract to the elder John McArthur, affording John Jr. the opportunity to collaborate with his uncle once again; this would be their final documented collaboration. The cornerstone was laid on April 26, 1855 and the project proceeded with great speed, reaching substantial completion before the end of the year.<sup>29</sup> The new buildings of the First and Tenth Presbyterian churches were dedicated only a few months

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& Co., 1852), 82-83; Central Committee, Appointed by the General Congregational Convention, October 1852. *A Book of Plans for Churches and Parsonages* (New York, NY: Daniel Burgess & Company, 1853).

<sup>27</sup> *The Presbyterian Church in Philadelphia: A Camera and Pen Sketch of Each Presbyterian Church and Institution in the City*, ed. Rev. Wm. P. White, D.D., and William H. Scott (Philadelphia: Allen, Lane & Scott Publishers, 1895), 25.

<sup>28</sup> "The Corner Stone of the new edifice..." *West Jersey Pioneer*, July 22, 1854.

<sup>29</sup> Rev. Alfred Nevin, *History of the Presbytery of Philadelphia, and of the Philadelphia Central* (Philadelphia, PA: W.S. Fortescue & Co., 1888), 334-5.

apart, on October 15, 1856 and January 4, 1857, respectively.<sup>30</sup> As McArthur's designs for Tenth and First Presbyterian overlapped, the sequence of events evidences that his design for the smaller First Presbyterian steeple was derivative, an adaptation, from his design for the larger Tenth Presbyterian steeple.

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The last few years before the Civil War were tumultuous, bringing with them another economic crisis, this time on an international scale. Through the Panic of 1857, another economic depression had hit the United States and competition among architects for work was fierce.<sup>31</sup> Fortunately for McArthur, his practice was well established and, in addition to many other commissions, he had two more ecclesiastical structures underway: the Mikveh Israel Synagogue (Fig. 5), and the Frankford Presbyterian Church (Fig. 6), both completed in 1860, and both of which bear similarities, in form and detailing of the facades, to First Presbyterian.<sup>32</sup> But in spite of the challenges that the nation and the architecture profession were facing at this time, there was an sense of optimism and big ideas taking hold in the field. In 1857, thirteen architects met in the office of New York architect Richard Upjohn with the goal of forming an organization to promote architects and architecture; two months later the American Institute of Architects (AIA) was incorporated.<sup>33</sup> Back in Philadelphia, John McArthur, Jr. also had a hand in trying to influence the direction that architectural education and practice would move in the

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<sup>30</sup> Gibbon, *History of the "First Presbyterian Church" of Salem. N.J.*, 16; Thompson Westcott, *Guide Book to Philadelphia: A New Handbook for Strangers and Citizens* (Philadelphia: Porter and Coates, 1875), 277.

<sup>31</sup> Woods, 33.

<sup>32</sup> Congregation Mikveh Israel records, Historical Society of Pennsylvania's Hidden Collections Initiative for Pennsylvania Small Archival Repositories, Philadelphia; Rev. Thomas Murphy, *One Hundred Years of the Presbyterian Church of Frankford* (Philadelphia: Presbyterian Church of Frankford, 1872), 87.

<sup>33</sup> Woods, 34.

coming decades. In 1860, he authored a resolution of intent to establish a new architectural school within the Polytechnic College of Pennsylvania.<sup>34</sup> And in 1861, in response to the AIA's lack of local chapters, he acted as one of the founders of the independent organization, the Pennsylvania Institute of Architects, with its goal similar to that of the AIA: "to unite in fellowship the architects of this continent."<sup>35</sup> Unfortunately, neither of these organizations that McArthur endeavored to start got a foothold, as they were soon to be disrupted by the outbreak of the Civil War in the spring of 1861.

Much of the construction accomplished during the Civil War consisted of government construction. McArthur, now nearing 40 years old, was fortunate to be appointed as Architect under the Quartermaster General's Department in Philadelphia for the duration of the war, ensuring him steady work and steady pay in uncertain times.<sup>36</sup> During this time he was responsible for designing and erecting twenty-four temporary hospitals. Also during the war, he designed a new residence for himself and his family which was completed in 1864.<sup>37</sup> His relocation to West Philadelphia, by 1866, precipitated his resignation from Tenth Presbyterian where he had been a congregant and Trustee for a decade.<sup>38</sup> His move from the city and departure from the urban church marked the beginning of a trend – an exodus to the suburbs causing neighborhood membership in the church to steadily decline. Since the consolidation of Philadelphia a decade earlier, the city population exploded – expanding from eleven thousand in

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<sup>34</sup> Cohen, 172-73.

<sup>35</sup> George Champlin Mason, "Professional Ancestry of the Philadelphia Chapter," *Journal of the American Institute of Architects* Vol. 1 No. 9 (September 1913): 382.

<sup>36</sup> Lawrence Wodehouse, "John McArthur, Jr. (1823-1890)," *Journal of the Society of Architectural Historians* Vol. 28, No. 4 (December 1969), 277.

<sup>37</sup> *Ibid*, 278.

<sup>38</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, 1857-1894.



1850 to twenty-three thousand in 1860.<sup>39</sup> For the second half of the century, West Philadelphia largely became a suburb of the city. By the end of the nineteenth-century, only a third of the Tenth Presbyterian members lived in the Rittenhouse neighborhood.<sup>40</sup> In retrospect, one could say that McArthur parting company with Tenth Presbyterian came just in time for him. The ensuing decades brought problems associated with the aging and upkeep of the massive steeple. As numbers of congregants and church revenues dropped, the condition of the steeple worsened, and maintenance demands became more frequent and expensive. Certainly unintentionally, McArthur escaped any reprisal for having been the author of such a liability.

After this point, the stories of John McArthur, Jr. and of the two steeples of his design become separate. McArthur went on to have a diverse career, engaging not only in design and construction, but also in patenting various designs and materials, entering numerous competitions, and overseeing materials testing for performance characteristics.<sup>41</sup> He established his professional affiliations with the AIA in 1869, joining the national organization as a fellow and founding the Philadelphia Chapter to address concerns of regional representation, serving as its first president.<sup>42</sup> When the local AIA chapter established their offices at the Athenaeum, constructed by his uncle John, McArthur followed suit and moved his office there to the third

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<sup>39</sup> Jake Blumgart, "West Philadelphia," *The Encyclopedia of Greater Philadelphia*, 2017, <https://philadelphiaencyclopedia.org/archive/west-philadelphia-essay/>.

<sup>40</sup> *Making God's Word Plain; One Hundred and Fifty Years in the History of Tenth Presbyterian Church of Philadelphia*, ed. James Montgomery Boice (Philadelphia: Tenth Presbyterian Church, 1979), 60.

<sup>41</sup> John McArthur, Jr.. 1866. Design for Railing. US Patent 2303, issued May 1, 1866; Wildrich Winterhalter and John McArthur, Jr.. 1867. Improved Flooring and Paving-Tiles and Building-Blocks. US Patent 70,144, issued October 22, 1867; John McArthur, Jr.. 1868. Masonic Hall. US Patent 2866. issued January 28, 1868; "Report of Progress by the Committee on the Compressive Strength of Cements and the Compression of Cements and Settlement of Masonry." Paper presented at the Annual Convention of the American Society of Civil Engineers, Denver, CO, July 5, 1886.

<sup>42</sup> Nancy Hadley, AIA Director of Archives & Records, correspondence to author, June 24, 2019; Mason, 384.

floor.<sup>43</sup> The crowning achievement of his career was inarguably the design and construction of Philadelphia City Hall that, through its monumentality, became, in the words of Michael J. Lewis, “a haunting epic that dwarfed the personalities who were its creators.”<sup>44</sup> Of his personality, Lewis writes, “He was unusual in nothing so much as his remarkable ordinariness... Rather than an artistic cosmopolite, McArthur was an American Presbyterian, supported by the strong lattice of values of Protestant America: morality, respectability, orderliness.”<sup>45</sup> But for all the ways in which McArthur was an ordinary (if accomplished) architect, he did have a spark of structural bravado that punctuated his career at several junctures – one of those points being the two wood-framed steeples of his early days.

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<sup>43</sup> Roger W. Moss, *Philadelphia Victorian: The Building of the Athenaeum* (Italy: The Athenaeum of Philadelphia, 1998), 118.

<sup>44</sup> Michael J. Lewis, “‘Silent, Weird, Beautiful’: Philadelphia City Hall,” *Nineteenth Century (Victorian Society in America)* Vol. 11 (3-4) (1992): 20.

<sup>45</sup> *Ibid*, 18.

## Chapter 2: McArthur's Steeples: The Highest Structures

By the mid-1850s, the skylines of both Philadelphia, Pennsylvania and Salem, New Jersey were punctuated by the wood steeples of McArthur's design (Fig. 2): those of the West Spruce Street Presbyterian Church (Tenth Presbyterian) at 248 feet, and the First Presbyterian Church of Salem at 165 feet.<sup>1</sup> While the two steeples differed in size, they were both remarkably tall structures and towered at heights approximately six times higher than their surrounding neighborhoods. The great height of McArthur's steeples is emblematic of the way in which American spires of this period become exceedingly high, perhaps as a result, architectural historian Michael Lewis muses, of "untrammelled competitive zeal...[in the American] rollicking free-for-all between Methodists, Baptists, Presbyterians, Lutherans, Catholics, etc."<sup>2</sup> This convergence of factors included the progression of the ecclesiastical ideal of "reaching toward heaven," the American carpentry-based approach to construction, and the lack of any authority enforcing "good taste and visual order."<sup>3</sup> McArthur's steeples can be seen within the context of these factors, as well as a manifestation of McArthur's determination to accomplish architectural and engineering feats. Steeples, as virtuosic feats of structural accomplishment, gave architects in this newly emerging profession the opportunities they needed to establish their competency. During this period, one of McArthur's contemporaries, Samuel Sloan, writes of his steeple at the First Presbyterian Church of Kensington as "a spire of considerable altitude, recently erected by the author in the northern portion of Philadelphia, and which has attracted

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<sup>1</sup> Thompson Westcott, *Guide Book to Philadelphia: A New Handbook for Strangers and Citizens* (Philadelphia: Porter and Coates, 1875), 277; Watson and Henry Associates, *Steeple Assessment Report for First Presbyterian Church of Salem, Salem, New Jersey* (Bridgeton, NJ: Watson & Henry Associates, 1996), 1.

<sup>2</sup> Michael J. Lewis, correspondence to author, August 8, 2019.

<sup>3</sup> *Ibid.*

a considerable degree of attention” – his remarks indicating the value of public opinion gained by way of the design of a steeple.<sup>4</sup>

Also by the mid-nineteenth century, most of the large array of Protestant sects and denominations in America had in common a deep evangelical emphasis. This evangelicalism shared among the Protestant sects became the dominant form of spiritual expression and gave rise to various religious revivals. The nineteenth century began with the Second Great Awakening, and the latter half of the century saw the Third Great Awakening, in which congregations were unabashedly competing for new congregants. In this competition, Presbyterians faced the specific predicament of being more conservative than their revivalist competition, and therefore resistant to the “hell-fire and brimstone” style of preaching that attracted converts.<sup>5</sup> Conspicuous church buildings with impressive spires, along with other measures such as Sunday schools, became useful alternatives in winning over converts. The success of their strategy is evidenced in the increased membership within Presbyterian church congregations, both urban and suburban. The congregation of Tenth Presbyterian Church of Philadelphia, for example, burgeoned to one and a half times its size in the first twenty-five years following its formation.<sup>6</sup> With increased church membership came increased revenue and the resultant proliferation of new church buildings to house the growing numbers of congregants.

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<sup>4</sup> Samuel Sloan, *Sloan's Constructive Architecture; A Guide to the Practical Builder and Mechanic* (Philadelphia, PA: J.B. Lippincott & Co., 1866), 54.

<sup>5</sup> Rodney Hessinger, *Seduced, Abandoned, and Reborn: Visions of Youth in Middle-Class America, 1780-1850*. (Philadelphia, PA: University of Pennsylvania Press, 2005), 96.

<sup>6</sup> *Making God's Word Plain; One Hundred and Fifty Years in the History of Tenth Presbyterian Church of Philadelphia*, ed. James Montgomery Boice (Philadelphia: Tenth Presbyterian Church, 1979), 99.

The construction of both the Tenth Presbyterian and First Presbyterian church buildings directly resulted from the need to accommodate increasing numbers of congregants newly enlisted during the early days of the Third Great Awakening. First Presbyterian, constructed in 1856 as “a more commodious house of worship for the use of [the] Church & Congregation,” replaced an earlier and more modest building constructed in the early 1820s.<sup>7</sup> The Tenth Presbyterian congregation in Philadelphia, which was founded c. 1829, was growing beyond the capacity of their church building at Twelfth and Walnut Streets. A new building was needed to house a colony congregation, or group of congregants who agreed to leave the overcrowded congregation to form a new church organization, splintering off from the parent congregation.<sup>8</sup> The design of these midcentury church buildings afforded McArthur the opportunity to design buildings that both conveyed the evangelicalism of the Presbyterian sect by attracting the attention of would-be congregants - and showcased his own abilities as a young architect.

### **First Presbyterian Church of Salem, New Jersey**

When the congregation of the First Presbyterian Church in Salem undertook construction of a new church edifice, their plans did not initially include a steeple. At some point during design or construction, the congregation made the decision to add a steeple to the design. While the final report of the congregation’s Building Committee does not explain how this change came to pass, it notes an additional contract for the steeple, the largest of numerous additional costs during the design and construction. In their report, delivered on

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<sup>7</sup> Minutes of the Board of Trustees, First Presbyterian Church of Salem, New Jersey, 1821-1920, Papers of the First Presbyterian Church of Salem, New Jersey.

<sup>8</sup> *The Presbyterian Church in Philadelphia: A Camera and Pen Sketch of Each Presbyterian Church and Institution in the City*, ed. Rev. Wm. P. White, D.D., and William H. Scott (Philadelphia: Allen, Lane & Scott Publishers, 1895), 107.

Christmas Eve of 1856, the Building Committee acknowledged the extravagance of the church building with its steeple and offered an ideological explanation:

The entire cost of the Building... it will be seen here exceeded the original estimate, we have been prompted to these increased expenditures by a pardonable zeal to present to the congregation a handsome and substantial Edifice which we, and our children, who may fill our places in the Church Militant, when our days upon this earth shall be numbered may worship the Lord our God.

While in some respects your committee see where they have erred in judgments, they resign their Commission conscious that all their acts have been done with the best of motives and ardent desire to promote the glory of God.<sup>9</sup>

Building Committee of the First Presbyterian Church Edifice  
Salem, December 24, 1856

Their reference to the “Church Militant” appears to refer to the whole body of living Christian believers, as if to say that their endeavor was part of a much broader and more meaningful continuum. And therefore, their errors in judgement that caused the cost of the new building to exceed the congregation’s budget, should be forgiven. And so, at 165 feet high, First Presbyterian became the highest building in the city of Salem, New Jersey – a title which the building retains to this day. Some early accounts erroneously credit the steeple with a height of 184 feet.<sup>10</sup> This early miscount of the height of the steeple was possibly based on a height above mean sea level, though this would still not be quite right, and may more likely indicate a degree of exaggeration in the historical account. The driving concept that the grandeur of the church building “promotes the glory of God” was also employed in McArthur’s grander design for Tenth Presbyterian, as the enormous steeple towered hundreds of feet above the surrounding neighborhood. The church was the third building to hold the title of the tallest building in

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<sup>9</sup> Minutes of the Board of Trustees, First Presbyterian Church of Salem, New Jersey.

<sup>10</sup> Quinton Gibbon M.D., *History of the “First Presbyterian Church” of Salem. N.J.* (Salem, NJ: Session of the First Presbyterian Church of Salem, N.J., 1889), 16.

Philadelphia, preceded by the Pennsylvania State House, or Independence Hall, and Christ Church, the Anglican congregation of many American founding fathers.

### **Tenth Presbyterian Church of Philadelphia, Pennsylvania**

Throughout the seventeenth and nineteenth centuries, in America and abroad, steeples and spires were by far the tallest structures in cities, and thus were ubiquitous features of their skylines. Major cities were defined by the number and height of their spires. The English poet, Lord Byron, captured the image of the nineteenth-century skyline of London: ““A mighty mass of brick, and smoke, and shipping, Dirty and dusty, but as wide as eye Could reach... a wilderness of steeples peeping On tiptoe through their sea-coal canopy... and there is London Town.”<sup>11</sup> Similarly, the Philadelphia skyline was defined by its steeples, as depicted in various early illustrations from the vantage point of the Delaware River, many based on an original depiction by colonial artist George Heap (Fig. 7). These steeples provided viewers with fixed points of reference, and reminders of the civilization that created them. By the nineteenth century, Philadelphia was expanding westward, shifting the center of civic and residential life away from the colonial center of Old City. As the city grew, the optimal viewpoint shifted from the Delaware River, to vantage points west. One Philadelphia columnist asked viewers:

Have you ever, on a bright, clear Sunday morning, viewed the city from the elevation of Thirty-second and Market Streets? It is a glimpse well worth your taking, and for an observer who has a particular object to view no better position can be obtained. It is an excellent location, for instance, from which to observe the steeples and towers of Philadelphia. Many of our handsomest and tallest buildings are on streets so narrow that from close quarters it is impossible to observe, with any pleasure, the architectural beauty of their towers, but from a high position combined with distance they can be admired to perfection.<sup>12</sup>

The Towers and Spires of Philadelphia  
Philadelphia Inquirer, August 20, 1893

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<sup>11</sup> Lord Byron, “London,” *Don Juan*, (1819-1824).

<sup>12</sup> “The Towers and Spires of Philadelphia,” *Philadelphia Inquirer*, August 20, 1893.

By mid-century, the colonial city that Christ Church had towered over was changing rapidly. The Rittenhouse neighborhood was growing with commercial and maritime businesses, and was quickly becoming the city's most upscale residential neighborhood, along with a full range of supporting buildings from shops and offices to schools and churches. Growing ecclesiastical congregations of many denominations saw in the Rittenhouse neighborhood an opportunity for expansion of their evangelical missions. The National Register of Historic Places Nomination for the Rittenhouse Historic District identifies at least a dozen such church buildings and chapels constructed in the latter half of the nineteenth century.<sup>13</sup>

One of the multitude of church buildings popping up in Rittenhouse was McArthur's Tenth Presbyterian Church (Fig. 8). In his design for the church building, McArthur mirrored the ambitions of the church congregation, in what Teitelman and Longstreth describe as "a handsome and vigorous Lombard pastiche" of orange brick and iron ornament.<sup>14</sup> The remarkable feature of the church building, however, was not its architectural style but the sheer scale of the massive tower and spire that rose 248 feet above the ground, making it by far the highest structure in the city. Tenth Presbyterian retained its title as the tallest building in Philadelphia for 16 years, being beaten in 1873 by the Masonic Temple by a margin of only two feet.<sup>15</sup> In 1883, the congregation officially abandoned the West Spruce Street moniker, assuming the name of the parent congregation to become the sole Tenth Presbyterian Church.

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<sup>13</sup> National Register of Historic Places, Rittenhouse Historic District, Philadelphia, Philadelphia County, PA, National Register #71997456.

<sup>14</sup> Teitelman and Longstreth, *Architecture in Philadelphia*, 94.

<sup>15</sup> National Register of Historic Places, Masonic Temple, Philadelphia, Philadelphia County, PA, National Register #71000727.



It is unclear how the congregation of Tenth Presbyterian decided to undertake the construction of such a massive tower and steeple. During the period of time that McArthur was preparing designs for the new church building, he was elected as a trustee (December 1852) and teller (April 1854) of the new congregation.<sup>16</sup> His privileged position within the congregation likely afforded him greater influence in the decision-making process than he would have had working for a typical client. His position within the church organization was later reinforced with his appointment as Architect of the Church (November 1854) and election as deacon (April 1856).<sup>17</sup> Within his home congregation, it is possible that McArthur leveraged his position to afford himself latitude to exercise his design capabilities. But at both churches, perhaps with the congregations challenging McArthur to create a showpiece to attract new congregants, it is likely that the idea of promoting “the glory of God” was an influencing factor. Both church buildings demonstrate that, despite their Reformed heritage that shunned material expressions of God, they overcame their apprehensions.<sup>18</sup> The tremendous scale of the steeple provides a strong material element for the expression of the divine and of their beliefs.

### **The Ideology of High Steeples**

The late nineteenth century brought about the first generation of skyscrapers, made possible by the advent of cast iron and steel structural framing. But in the decades preceding the skyscraper, architects and builders strove to create high structures utilizing traditional loadbearing masonry and wood framing. They pushed the limits of traditional building materials

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<sup>16</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, Philadelphia, Pennsylvania, 1857-1894, Papers of the Tenth Presbyterian Church, Philadelphia, PA.

<sup>17</sup> Ibid.

<sup>18</sup> Jeanne Halgren Kilde, *When Church Became Theatre: The Transformation of Evangelical Architecture and Worship in Nineteenth-Century America* (New York, NY: Oxford University Press, 2002), 201.

prior to the arrival of new materials. These tall steeples provide rich examples of what could be accomplished using traditional building materials and adapting them as necessary to reach greater heights. McArthur's wood-framed steeples illustrate the ideological, societal, functional, and perhaps personal reasons at play in the design and construction of high steeples. A few years before he embarked on his design of Tenth Presbyterian, McArthur expressed great confidence in his structural design ability. Regarding his design for a truss girder published in the *Journal of the Franklin Institute*, McArthur was noted as being "convinced that the [load testing] result would have been the same, had a much greater weight been applied" - this illustrates McArthur's structural confidence and sets the stage for his wood-framed steeple designs a few years later.<sup>19</sup>

In his essay on spires contained in his widely-circulated book *Constructive Architecture*, eminent architect, Samuel Sloan summarizes the role and importance of spires in ecclesiastical architecture: "And whether [the spire] 'points its airy finger toward heaven' from amid the trees..., or rises in towering magnificence far above the roofs and domes of the populous and busy city, the spire is always a beautiful and appropriate appendage to the house of God."<sup>20</sup> The ideology that religious buildings have a power associated with the divine dictates that church buildings should comprise architectural elements that distinctly convey this power. As historian Gretchen Buggeln observes, spires are arguably the architectural elements most readily able "to carry metaphorical associations... A steeple breaking through the horizon, reaching toward the

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<sup>19</sup> "A New Truss Girder," *Journal of the Franklin Institute, of the State of Pennsylvania, for the Promotion of the Mechanic Arts; Devoted to Mechanical and Physical Science, Civil Engineering, the Arts and Manufactures, and the Recording of American and Other Patent Inventions (1828-1851)* Vol. 17, no. 1, (January 1, 1849): 16.

<sup>20</sup> Samuel Sloan, 51.

skies, pointing the way to heaven, was the most obvious sign that there was a house of God.”<sup>21</sup>

In his study of American churches, polymath Roger Kennedy, notes that religious buildings are organized on an “axis of attention... In this way our physical attention is attracted toward a physical focus, which has a symbolic role in attracting our theological focus upon one way of perceiving the Mystery [of God]. These axes [such as the spire] suggest metaphorically that God is... UP THERE.”<sup>22</sup> The imagery of the spire pointing toward heaven became ubiquitous in essays, poems and literature about the architecture of church buildings, particularly in the context of nineteenth century evangelicalism. Spires, as physical metaphors for the spiritual reach for heaven, play an essential role in the way that church buildings connect the divine with the human.”<sup>23</sup>

### **The Identity Crisis in Protestant Church Building**

In the late eighteenth and earlier nineteenth century, the construction of tall steeples was growing in popularity but also drew some criticism from within Protestant circles for being too ostentatious and incongruous with their guiding principles. In these less liturgical denominations, the tendency to construct grand buildings was inhibited by aesthetic tradition and theological doctrine that favored simplicity and avoided what they called “popery,” or the Roman Catholic practices associated with the Pope.<sup>24</sup> Historian George Tatum recounts that as early as the 1750s, the steeple of the Second Presbyterian church building, at Third and Arch

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<sup>21</sup> Gretchen Buggeln, *Temples of Grace: The Material Transformation of Connecticut's Churches 1790-1840* (Lebanon, NH: University Press of New England, 2003), 160.

<sup>22</sup> Roger Kennedy, *American Churches* (New York: Stewart, Tabori & Chang, 1982), 229.

<sup>23</sup> Kilde, 10.

<sup>24</sup> Gwen W. Steege, “The *Book of Plans* and the Early Romanesque Revival in the United States: A Study in Architectural Patronage,” *Journal of the Society of Architectural Historians* Vol. 46, No. 3 (September 1987), 218.

Streets was subject to satirical criticism that suggested the spire of the Arch Street Church seemed too pretentious for Presbyterians.<sup>25</sup> A century later, steeples continued to grow in height and extravagance, but similar satirical critique continued as evidenced in this anecdote:

There is quite a strife in Bridgeport [PA] to see who can build the highest steeples. The Congregationalists say that they will have the highest steeple in the State. A few days since one of the Congregationalists met an Episcopalian and pointing to their new church, now in the course of construction, he remarked, 'there, look at the high belfry. We shall put 160 feet more on top of that, and thus have the highest steeple in the State.' 'Yes,' replied the Episcopalian, 'and you would probably make it still higher if you could, but that is as high as your society own.'<sup>26</sup>

Dollar Newspaper  
Philadelphia, June 13, 1849

It is clear that as Protestant congregations moved to build ever higher steeples, there were two different ideas at odds in the decision making. On one hand, there were the roots of the Reformation and the move away from the ideals of the Catholic faith and its inherent materiality. On the other hand, there were the founding Calvinist concepts in which worldly success could be interpreted as an indicator of God's favor, and thus church buildings acted as barometers of the success and virtue of the congregants within. Samuel Sloan encapsulated the idea that a balance should be sought: "We view with natural displeasure any parsimony that may exhibit itself in the house of God, and at the same time dislike great attention to physical comfort, or lavish expenditure in decoration as showing too much regard merely to the place of worship."<sup>27</sup>

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<sup>25</sup> Tatum, *Penn's Great Town*, 27.

<sup>26</sup> "A Fair Hit," *Dollar Newspaper* (Philadelphia, PA), June 13, 1849.

<sup>27</sup> Samuel Sloan, *The Model Architect: A Series of Original Designs for Cottages, Villas, Suburban Residences, etc. Accompanied by Explanations, Specifications, Estimates and Elaborate Details Prepared Expressly for the Use of Projectors and Artisans Throughout the United States* (Philadelphia, PA: E.S. Jones & Co., 1852), 82.

In some cases, such as Holy Trinity Episcopal Church (1859), the modesty of the Reformation prevailed in the construction of a church building absent of a steeple. In some accounts, the congregation's rector rejected John Notman's original design for a 225-foot spire, based on the belief that a spire pointed upward signified a God apart from men, while a lower tower would represent God on a closer level to man.<sup>28</sup> However, a closer read of the proceedings during construction reveal that the congregation of Holy Trinity had every intention of constructing Notman's tall steeple if not for the necessity to postpone it due to budget overruns.<sup>29</sup>

Less than a quarter of a mile away, McArthur's Tenth Presbyterian (Fig. 9), complete with the tallest steeple to ever stand in Philadelphia, stood in stark contrast to Holy Trinity with its truncated tower (Fig. 10). The monumentality of Tenth Presbyterian, as a material expression of God, demonstrated that the congregation had certainly overcome their Reformed heritage and fully subscribed to the use of the church building to reflect their success. The residents of Rittenhouse were an example of the new middle classes that composed many evangelical congregations who valued the material life and comfort and deliberately incorporated them into their houses of worship.<sup>30</sup> Operating within this religious value system, architects such as McArthur used their designs to disseminate the congregations belief in a divine being to the surrounding world.

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<sup>28</sup> Robert Morris Skaler and Thomas H. Keels, *Philadelphia's Rittenhouse Square* (Charleston, SC: Arcadia Publishing, 2008), 51.

<sup>29</sup> Constance M. Greiff, *John Notman, Architect: 1810-1865* (Philadelphia, PA: The Athenaeum of Philadelphia, 1979), 214-215.

<sup>30</sup> Kilde, 201.

## Competitiveness and Personal Accomplishment

In addition to religious ideology, another reason underlying the construction of increasingly high structures is innate human competitiveness. The announcement of the construction of a new tall building could hardly happen without the mention of its rank as the highest structure, wherever it was. In 1850, upon the completion of T.U. Walter's "Gothic Chapel" in Shanghai, China, the letter from the missionary in China proudly announced that, at a height of 187 feet, was highest structure in the city, and was visible from miles around.<sup>31</sup> He went on to establish the ideological value in its height: "...and to the Gentiles who walk by sight, it is a standing monument of a preached gospel."<sup>32</sup> Through the lens of evangelical Christianity, these tall steeples in faraway lands were identifiable icons of Protestantism and served as a comfort to followers of that faith.

By the mid-nineteenth century, the construction of tall structures, steeples in particular, had risen to the level of somewhat of a sport. Samuel Sloan appends to his essay on spires a roster, or "Table of Altitudes of Celebrated Spires," in which he provides statistics for twenty-one spires throughout Europe, primarily in the United Kingdom, recording spires as tall as Old Saint Paul's in London at 534 feet.<sup>33</sup> It is important to note that all of the spires listed by Sloan range from medieval to Renaissance, with construction dates ranging from the early-12<sup>th</sup>-century and the early-16<sup>th</sup>-century. By no means were these European stone spires of the same ilk as the wood-framed spires popping up on church buildings in the United States. Sloan's

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<sup>31</sup> T. U. Walter, "Design for a Church at Shanghai, China," architectural elevation, November 11, 1850, Thomas Ustick Walter Collection, Athenaeum of Philadelphia, [https://www.philadelphiabuildings.org/pab/app/image\\_gallery.cfm?RecordId=18BF5BE8-77F7-4DBB-94FA67C5EC2AD5DE](https://www.philadelphiabuildings.org/pab/app/image_gallery.cfm?RecordId=18BF5BE8-77F7-4DBB-94FA67C5EC2AD5DE).

<sup>32</sup> "A Gothic Chapel in China," *Bridgeton Chronicle* (Bridgeton, NJ), September 21, 1850.

<sup>33</sup> Sloan, *Sloan's Constructive Architecture*, 53.

audience in this book were the “builder-readers,” as architectural historian Dell Upton refers to them.<sup>34</sup> While it’s clear that Sloan did not intend for American builders, most familiar with brick and wood construction, would attempt to construct replicas of the stone spires of Europe. He did, however, probably intend to encourage aspirations to emulate them. Sloan’s promotion of European stone spires coincides with the nineteenth-century tendency toward Gothic forms for steeple designs. In Sloan’s inclusion of this “Table of Altitudes,” what was clear was that the construction of a very tall structure was regarded as an accomplishment, deserving of honor; and when a new, taller structure came along, the previous one was considered *beaten*, as if defeated in a contest. It is difficult, if not impossible to pinpoint a date when such discourse emerges. However, by the mid-nineteenth-century, the obsession with height escalated to somewhat of a competitive sport. A typical mid-nineteenth century news article illustrates the sport inherent in steeple construction of the day:

Strasbourg Cathedral is now beaten. It no longer has the highest spire in Europe. The new Church of St. Nicholas, Hamburg, has just been finished, and the great cross was placed on the summit the week before last. The total height is 472 feet. This is 6 feet higher than Strasbourg.<sup>35</sup>

Daily Tribune  
Chicago, October 1, 1874

In this spirit of competitively tall construction, McArthur’s design for Tenth Presbyterian was his successful foray into his lifelong pursuit of designs dominated by remarkably tall towers. In 1873, McArthur partnered with engineer Joseph M. Wilson to enter the competition for the Exhibition Hall for the Centennial International Exhibition of 1876; the partnership with an engineer was useful to McArthur, as the proposal was to construct the hall largely of mass-

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<sup>34</sup> Dell Upton, *Pattern Books and Professionalism: Aspects of the Transformation of Domestic Architecture in America, 1800-1860*. Winterthur Portfolio Vol. 19, No. 2/3 (Summer - Autumn, 1984), 111.

<sup>35</sup> “Miscellaneous,” *Chicago Daily Tribune*, October 1, 1874.

produced iron parts.<sup>36</sup> Their unsuccessful submission featured a 500-foot tower which, had it been built, would have been at that time the highest in the world.<sup>37</sup> Meanwhile, beginning in 1871 and continuing for three full decades, the construction and evolution of McArthur's design for the Philadelphia Public Buildings, later known as City Hall, was underway. The most notable element of the evolution was the heightening of the tower to its eventual 548 foot stature. The tower of City Hall not only earned it the title of the tallest structure in Philadelphia, but it briefly stood as the tallest structure in the world, until being surpassed during construction by the Washington Monument (555 feet in 1884).<sup>38</sup> Before City Hall was even completed, it was regarded as one of McArthur's greatest architectural accomplishments, as noted in a late-nineteenth retrospective of prominent Philadelphians: "This grand structure... whose lofty tower has no rival in the world in height and massiveness, was built in accordance with his plans, and superintended by him till his death... No nobler monument to architectural genius than this, which John McArthur has left to perpetuate his fame, could be devised."<sup>39</sup>

### **The Advantages and *Shortcomings* of High Steeples**

While both of McArthur's steeples include belfries as architectural forms, it does not appear that either structure housed bells or served as actual bell towers. However, it is worth noting that construction of church steeples to a significant height was necessary for acoustic performance. Samuel Sloan notes that from the Christian tradition, "thus arose the use of bells to notify the time of meeting, and also the appropriate buildings to contain them; which in order

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<sup>36</sup> Domenic Vitiello, "Engineering the Metropolis: William Sellers, Joseph M. Wilson, and Industrial Philadelphia," *The Pennsylvania Magazine of History and Biography*, Vol. 126, No. 2 (April 2002), 275.

<sup>37</sup> Tatum, 104.

<sup>38</sup> "Setting the Capstone," *Philadelphia Inquirer*, December 8, 1884.

<sup>39</sup> *Makers of Philadelphia; An Historical Work*, ed. Charles Morris (Philadelphia, PA: L.R. Hamersly & Co., 1894), 210.



to diffuse more widely the sounds, were elevated above the continuous ordinary dwellings.”<sup>40</sup>

The successful acoustical performance of a belfry relates primarily to the height of the bell mounting relative to the height of surrounding buildings; this height is independent of the overall height of the surmounting spires, which was driven more by aesthetics than acoustics. The construction of a belfry too low for its purpose could have a disastrous outcome, as was famously played out in an 1877 lawsuit against Saint Mark’s Episcopal Church in Philadelphia filed by nearby residents of Rittenhouse. In the course of the trial, testimony was given by many architects, including Samuel Sloan and Addison Hutton, who testified as to their beliefs about best practices in the design of belfries, particularly with respect to height. The judge ultimately issued a silencing order against Saint Mark’s, with a provision that the bells could be rung if it could be done “with injurious consequences,” such as by heightening the tower.<sup>41</sup>

While there were many compelling reasons for congregations to undertake the construction of very high steeples, these structures brought with them multiple drawbacks, including high initial construction costs, maintenance challenges, and threats posed by storms. It is often difficult to unravel the construction cost of one building element from the whole, making the actual cost of steeples relative to the overall building cost hard to quantify. In the case of McArthur’s design for First Presbyterian in Salem, New Jersey, the steeple was added through change order, making it possible to understand its relative cost. In that case, the overall cost to construct the church building was just over \$27,000; the change order for the steeple was \$1,600, adding only 6% to the construction costs.<sup>42</sup> However, in many cases this additional

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<sup>40</sup> Sloan, 41.

<sup>41</sup> Report of Harrison et al. vs. St. Mark’s Church, Philadelphia; A Bill to Restrain the Ringing of Bells so as to Cause a Nuisance to the Occupants of the Dwellings in the Immediate Vicinity of the Church, In the Court of Common Pleas, No. 2 In Equity, 1877, 490-491.

<sup>42</sup> Minutes of the Board of Trustees, First Presbyterian Church of Salem, New Jersey.

cost was enough to force congregations to abandon the effort, such as in the case of Holy Trinity Episcopal Church in Rittenhouse, discussed previously. As Samuel Sloan points out, “Thus, those immediately interested in these [church] constructions are often compelled, contrary to their own immediate wishes and preferences, to dispense with the spire, solely on account of the increased outlay which its erection would involve.”<sup>43</sup>

As with all parts of a building, steeples required routine maintenance, particularly repainting and flashing repairs. Maintenance activities were generally carried out by steeplejacks, working by scaling the structure using systems of ladders and ropes, known as rigging. Rigging installation on tall steeples was difficult to accomplish and therefore costly. Congregations who were the stewards of tall steeples quickly realized that when their steeple had to be rigged for one reason, other maintenance activities should be carried out at the same time to realize the economy in accessing the structure. In the case of Tenth Presbyterian, over a 4-decade span, maintenance activities on the steeple became necessary on at least eight separate occasions. A review of the Trustee’s Minutes reveals generations of Committees of Curators who were aware of the need to economize on maintenance costs as each generation all too often resolved to paint the steeple while the rigging was up for other repairs.<sup>44</sup>

The greatest threat to tall steeples is that posed by storms. Due to their height, they are susceptible to damage from wind, and the differential between their height and their surrounding environment makes them very likely to be struck by lightning. Both of McArthur’s steeples very clearly illustrate cyclical damage caused by storms, both by wind and lightning

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<sup>43</sup> Sloan, 49.

<sup>44</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, Philadelphia, Pennsylvania, 1857-1894, Papers of the Tenth Presbyterian Church, Philadelphia, PA.

strikes. The Tenth Presbyterian church building, for example, required repairs from storm damage at least once per decade. The two steeples, though separated by approximately 40 miles, were subject to the same regional weather events. Two of the greatest weather events during this period were the Gale of 1878, and the Winter Storm of 1912. During these two weather episodes, both steeples sustained serious damage, with the latter storm leading to the demolition of the steeple of Tenth Presbyterian.

The aspect of storms that poses perhaps the greatest threat to tall steeples, particularly wood-framed steeples, is that of lightning strikes and resultant fires. One famous lightning incident in Philadelphia occurred in 1908, when lightning struck the top spire of Christ Church, igniting a fire. Some modern accounts, or mythologies, recount the story that in a quasi-miraculous moment, the sudden burst of a thunderstorm suppressed the flames.<sup>45</sup> However, the accounts at the time of the fire reveal the reality that the flames were contained and extinguished by firemen, and that the spire was rebuilt after the fire.<sup>46</sup> The 1908 account states that because of the height of the steeple there was some delay in accessing the fire by hose, which illustrates that the problems presented by the height of a structure with respect to lightning and fire were then compounded by difficulties reaching it.<sup>47</sup> Even when historic structures were fitted with a lightning rod and grounding cables, significant damage could still be sustained by the sheer voltage being carried through the lightning protection system. During the 55 years that the steeple of Tenth Presbyterian steeple stood, minutes record it being struck

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<sup>45</sup> Stephen Salisbury, "The Leaning Tower," *Philadelphia Inquirer*, Saving History column, March 28, 2019.

<sup>46</sup> "Fire Kindled by Lightning; Imperils Old Christ Church," *Philadelphia Inquirer*, May 23, 1908.

<sup>47</sup> *Ibid.*

by lightning on average every 7-1/2 years.<sup>48</sup> Damage resulting from the lightning strikes ranged from minimal, to repeated destruction of the “rod down the spire” or “rod of the steeple” (presumably the lightning protection system). The repeated repairs to these great steeples are a testament to the congregations’ commitments to maintain their material expressions of God, pointing their airy fingers toward heaven as long as was possible.

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<sup>48</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, Philadelphia, Pennsylvania.

### Chapter 3: Architectural Analysis & the Design Context

#### The *Book of Plans*

If not for the fact that John McArthur Jr.'s designs for Tenth and First Presbyterian preceded the 1853 publication of *A Book of Plans for Churches and Parsonages*, it could easily be assumed that he relied on the book for his designs. When the General Congregational Convention met in October of 1852, with their purpose to assemble a book of sample plans and instructions for congregations seeking to build new church edifices, the trustees of the Tenth Presbyterian congregation in Philadelphia had already spent ten months planning their offshoot church building. The resemblance that one of the "more elaborate and costly designs" in the *Book of Plans*, Design XIII, bears to Tenth Presbyterian in Philadelphia (Fig. 11) belies the fact that McArthur was already developing his design a year prior to publication of the book.<sup>1</sup> This is significant because it demonstrates that different architects, in different parts of the eastern United States, were simultaneously developing similar ecclesiastical designs. Their concurrent design trends were due to the influences they were under from their clients, promulgation by larger religious organizations, and pattern books.

The design, by Austin & Brown Architects of New Haven, Connecticut, was sanctioned as "a very appropriate design for our cities."<sup>2</sup> Similarly, one of the more modest designs in the book, Design V, is a close likeness to McArthur's design for First Presbyterian (Fig 12), though it likely postdates his design.<sup>3</sup> The smaller church building design, by Sidney M. Stone also of New Haven, Connecticut, takes the form, with its central tower, that became popular for less urban

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<sup>1</sup> Central Committee, Appointed by the General Congregational Convention, October 1852. *A Book of Plans for Churches and Parsonages* (New York, NY: Daniel Burgess & Company, 1853), 44.

<sup>2</sup> *Ibid*, 44.

<sup>3</sup> *Ibid*, 35.

settings. The aesthetic relationship between McArthur's church building designs and designs in the *Book of Plans* must be seen not as interdependent, but both emerging from the same social undercurrents and design influences prevailing during this period. Historian William H. Pierson oversimplifies this milieu by suggesting that the book "touched off a wave of enthusiasm for the round arch that spread throughout the Congregational church, and following the Congregationalists, other non-Episcopal congregations turned to the round-arch mode."<sup>4</sup> In McArthur's work for several Presbyterian congregations, each predating publication of the *Book of Plans*, we see that the spread of the Round-Arched Style was not so linear.

The General Congregational Convention, and its resultant *Book of Plans for Churches and Parsonages*, came about as a reaction to the romanticism and Gothic Revival that had been permeating American culture, particularly church design throughout the 1840s. English-born architect Richard Upjohn was a major proponent of the Gothic Revival through his designs for over a hundred church buildings, most of which were for Episcopal congregations.<sup>5</sup> Trying to distance themselves from liturgical denominations, such as Episcopalians, the relatively liberal Congregationalists "began a thoughtful critical search for a style which would suit their own particular modes of worship."<sup>6</sup> The *Book of Plans*, which was published just one year after the convention, showcased colored lithographs of 18 church designs by 10 different professional architects, most notably Richard Upjohn. The text of the book included practical advice on choosing a site and using durable materials, as well as a commentary on each design. The *Book*

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<sup>4</sup> William H. Pierson, Jr., "Richard Upjohn and the American Rundbogenstil," *Winterthur Portfolio*, Vol. 21, No. 4 (Winter, 1986), 235.

<sup>5</sup> *Ibid*, 223.

<sup>6</sup> Kathryn Elizabeth Holliday, "Leopold Eidlitz and the Architecture of the Nineteenth Century America" (Dissertation, University of Texas at Austin, December 2003), 63; Gwen W. Steege, "The *Book of Plans* and the Early Romanesque Revival in the United States: A Study in Architectural Patronage," *Journal of the Society of Architectural Historians* Vol. 46, No. 3 (September 1987), 215.

*of Plans'* relevance extended far beyond the Congregational denomination, easily appropriated by various denominations and , according to historian Gwen Steege, became one of the most important architectural publications of mid-nineteenth-century America.<sup>7</sup> While Congregationalists are not Presbyterians, the two groups are both Reformed Calvinists in their theology and comprise the reformed Protestant community. Their differences in polity do not appear to have played a role in the architectural stylistic choices of the two denominations.

In the *Book of Plans*, the Central Committee of Congregationalists endeavored to remain neutral with respect to recommending a particular architectural style for church construction, "refusing to encourage their followers to choose between the Grecian and Gothic styles."<sup>8</sup> However, the fact that many of the participating architects felt that the "Romanesque" style, characterized by round-headed openings, was more appropriate to the Congregationalist faith remained evident. Richard Upjohn, for example, held the Gothic to be the style of the Anglican church, thus requiring a separate stylistic solution to suit the Congregationalist church of the New England forefathers.<sup>9</sup> The style they referred to as "Romanesque," or the American Round-arched Style, made up half of the 18 designs presented in the *Book of Plans*. One contemporary author, and Congregational minister, Oliver Daggett, criticized the publication for being "too exclusively towards the Romanesque."<sup>10</sup> Along with the illustrations in the book, "the ideas developed in its critical text... make it a primary advocate for the Romanesque, and help to explain why the style became so popular in this country in the second half of the century."<sup>11</sup> The

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<sup>7</sup> Gwen W. Steege, "The 'Book of Plans' and the Early Romanesque Revival in the United States: A Study in Architectural Patronage," *Journal of the Society of Architectural Historians*, Vol. 46, No. 3 (September 1987), 215.

<sup>8</sup> Holliday, 63.

<sup>9</sup> Pierson, 226.

<sup>10</sup> Steege, 222.

<sup>11</sup> *Ibid*, 215.

Romanesque style, in the nineteenth-century sense of the definition, while arguably a superficial treatment of details, suited the architectural and ecclesiastical criteria of the patrons who built them, and hence grew in popularity. As architectural historian Gwen Steege observes, the *Book of Plans*, in its advocacy of the Romanesque style, played a significant role in nineteenth-century revivalism in the United States.<sup>12</sup>

The likelihood that a Scottish-born architect, with a German partner, working in Philadelphia, and, separately, several Connecticut-born architects working in New Haven would simultaneously arrive at nearly identical designs seems remote. However, to understand the coincidence of their designs, we must first understand the confluence of factors that informed McArthur's designs and those that appeared in the *Book of Plans*. First, there was a preference for the Romanesque style developing among all evangelical congregations, particularly Presbyterian. This shift in taste was in part a reaction against the Gothic Revival; the alternative to the Gothic, as it was thought, was to build in the Romanesque style. Unlike the Gothic style, historian Gwen Steege observes, "in the Romanesque was a picturesque style which was affordable, but which did not carry associations with Roman Catholicism or Episcopalianism."<sup>13</sup> Second, this preference for the Romanesque style was fueled, if not ignited, by the *Rundbogenstil*, or round-arched style, that was being transferred to America through the immigration of formally-trained German architects. The *Rundbogenstil*, which had also grown out of a reaction to Neoclassical and Gothic Revivalism, "was not a historical revival but self-

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<sup>12</sup> Steege, 221-22.

<sup>13</sup> Ibid, 219.



consciously modern, synthesized from principles observed in the architectural styles of the past, and not a mere pastiche of the decoration or ornament of these various styles.”<sup>14</sup>

Finally, McArthur and his counterparts were compelled to incorporate into their designs the tall steeples that became increasingly prescribed as a necessity in church construction. However, in the bodies of architecture that *Rundbogenstil* drew from, including Lombard, Norman, Byzantine, and German Romanesque, tall spires were not part of the vocabulary. For their architectural inspiration for such tall spires, architects of the mid-nineteenth-century, turned their attention to gothic spires. Their incorporation of Gothic forms atop Romanesque structures betrays the very underlying principles of the *Rundbogenstil*, and represents a distinctly American departure from the German school of thought. This was not the first time architects would incorporate a gothic spire atop an otherwise stylistically disparate building – in many of over fifty redesigned London churches after the fire of 1666, Sir Christopher Wren retained Gothic towers and spires atop classical buildings.<sup>15</sup> As Samuel Sloan wrote of Wren’s influence on the ecclesiastical architecture of England, “the steeples that came into use were in imitation of the early [gothic] spires.”<sup>16</sup> Wren’s adept use of form and ornament to synthesize Gothic spires with classical buildings was arguably more sophisticated than nineteenth-century American attempts, it nonetheless placed Gothic spires in the architectural “grab bag” for application to other styles.

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<sup>14</sup> Michael J. Lewis, *The Politics of the German Gothic Revival: August Reichensperger* (Cambridge, MA: The MIT Press, 1993), 59.

<sup>15</sup> Gretchen Townsend Buggeln, *Temples of Grace: The Material Transformation of Connecticut's Churches, 1790-1840*. (Hanover, CT: University Press of New England, 2003), 79-80.

<sup>16</sup> Samuel Sloan, *Sloan's Constructive Architecture; A Guide to the Practical Builder and Mechanic* (Philadelphia, PA: J.B. Lippincott & Co., 1866), 49.

## John McArthur Jr. and the American Round-Arched Style

Most accounts categorize the architecture of the Tenth and First Presbyterian church buildings as some variation of the Lombard Romanesque style. Descriptions of Tenth Presbyterian have ranged from the exuberant “major exposition of the Lombard Romanesque Revival style,” to the less definitive “free adaptation of the Lombard Romanesque.”<sup>17</sup> <sup>18</sup> Early accounts, probably referring more specifically to the tall spires than the buildings supporting them, describe McArthur’s designs as having an association with the Gothic style. In 1875, when the imposing spire of Tenth Presbyterian still towered over the Rittenhouse neighborhood, a city guidebook described it as a “massive building of brick, ornamentally laid in the Gothic style.”<sup>19</sup> While the buildings themselves are certainly not Gothic revival, the steeples with their attenuated spires are Gothic in proportion and origin of form. The term “Lombard Romanesque,” particularly in nineteenth-century descriptions, is often also referred to as Anglo-Norman, Byzantine, Italianate, Lombard-Venetian, Norman, and Romanesque.<sup>20</sup> By any of these names, the architectural style of McArthur’s church designs is only partially captured; a more accurate description is that they are in the Round-Arched Style which evolved from the German *Rundbogenstil*.

John McArthur Jr. was exposed to advanced German architectural theory of the *Rundbogenstil* through Edward Collins, a German architect with whom he partnered briefly. The

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<sup>17</sup> Clio Group, Inc., Pennsylvania Historic Resource Survey Form for 1700-08 Spruce Street, Philadelphia, PA, Office of Historic Preservation, PA Historical & Museum Commission, August 13, 1980.

<sup>18</sup> Roger W. Moss, *Historic Sacred Places of Philadelphia* (Philadelphia, PA: University of Pennsylvania Press, 2005), 181.

<sup>19</sup> Thompson Westcott, *Guide Book to Philadelphia: A New Handbook for Strangers and Citizens* (Philadelphia: Porter and Coates, 1875), 277.

<sup>20</sup> Kathleen Curran, “The German Rundbogenstil and Reflections on the American Round-Arched Style,” *Journal of the Society of Architectural Historians* Vol. 47, No. 4 (December 1988), 366.

two young architects met through their mutual connections to Theodore Thierry, an architect and teacher, and facilitator of a “Karlsruhe-Philadelphia axis.”<sup>21</sup> Thierry, who was from Baden, completed his education as an architect in Germany and then emigrated to Philadelphia where he worked in the architectural office of John Haviland.<sup>22</sup> Thierry later went on to operate his own architecture practice and also taught drafting classes – McArthur was one of his students at the Carpenters' Company architectural school.<sup>23</sup> Thierry maintained contact with Carl Ludwig Thierry, apparently his uncle, who was the drafting teacher at the Karlsruhe Polytechnikum, and under whom Edward Collins had studied. Architectural historian Michael J. Lewis, who has studied the connections between German and Philadelphia architectural careers, observes that when Collins considered his emigration from Germany this connection might have played a role in him choosing Philadelphia.<sup>24</sup> Evidence points to this connection between the Thierry’s in Karlsruhe and Philadelphia as the source of McArthur and Collins introduction.<sup>25</sup>

Two years before John McArthur Jr.’s birth in the lowlands of Scotland, Edward Collins was born in Koninsberg, Prussia, which was then part of Germany.<sup>26</sup> The two young men found their way to the architectural profession by contrasting means, with McArthur apprenticing as a carpenter by day and studying architecture in the evenings, and Collins receiving a formal architectural education at the Karlsruhe Polytechnikum and the Berlin Bauakademie.<sup>27</sup> Their

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<sup>21</sup> Michael J. Lewis, “Der Rundbogenstil und die Karlsruhe-Philadelphia-Achse,” *Dauer und Wechsel : Festschrift für Harold Hammer-Schenk zum 60*, ed. Xenia Riemann, et. al. (Berlin: Lukas, 2004), 130.

<sup>22</sup> Ibid, “Der Rundbogenstil,” 130.

<sup>23</sup> Jeffrey A. Cohen, “Building a Discipline: Early Institutional Settings for Architectural Education in Philadelphia, 1804-1890,” *Journal of the Society of Architectural Historians*, Vol. 53, No. 2 (June 1994): 176.

<sup>24</sup> Lewis, “Der Rundbogenstil,” 130.

<sup>25</sup> Cohen, 165.

<sup>26</sup> Sandra L. Tatman, “Collins, Edward (1821-1902) Architect,” *Philadelphia Architects and Buildings*, [https://www.philadelphiabuildings.org/pab/app/ar\\_display.cfm/23013](https://www.philadelphiabuildings.org/pab/app/ar_display.cfm/23013).

<sup>27</sup> Michael J. Lewis, correspondence to author, April 13, 2019.

emigration from Europe also took very different paths - with McArthur travelling as a boy with his mother and siblings, and Collins as a young man, leaving his homeland in the wake of revolution – but ultimately led them both to Philadelphia. Despite their differences, the two young architects, united by a connection through their mutual instructors, became architectural partners for a brief time from the spring of 1851 to the summer of 1852.<sup>28</sup> Collins left Germany in 1848 or 1849, presumably “to escape the aftermath of the Revolution of 1848 and imprisonment.”<sup>29</sup> Upon Collins arrival in Philadelphia, he immediately found a job in the office of John McArthur, assisting McArthur on the House of Refuge.<sup>30 31</sup> In a short time, Collins became a partner in the company, and by 1851 McArthur & Collins was a leading firm in Philadelphia, designing the Girard House Hotel, then the most lavish hotel in the city.<sup>32</sup> It was during this business partnership that Collins introduced McArthur to the German *Rundbogenstil*, and perhaps even had a hand in the schematic design for Tenth Presbyterian, as evidenced by the clear German influence.

McArthur’s early ecclesiastical designs, particularly Tenth Presbyterian, are essays in the Round-Arched Style, and so it bears understanding the definition, history, theory, physical characteristics and modes of transmission to America of the *Rundbogenstil*.<sup>33</sup> In modern scholarship, it has come to mean any round-arched building with Romanesque or Italianate features designed by certain German architects in the late 1820s to the 1860s.<sup>34</sup> However, it is essential to understand the *Rundbogenstil* as a self-consciously modern style, separate and

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<sup>28</sup> Ibid.

<sup>29</sup> Tatman, “Collins, Edward (1821-1902) Architect.”

<sup>30</sup> Lewis, “Der Rundbogenstil,” 131.

<sup>31</sup> Cohen, “Building a Discipline,” 165.

<sup>32</sup> Lewis, “Der Rundbogenstil,” 132.

<sup>33</sup> Lewis, correspondence to author, April 13, 2019.

<sup>34</sup> Curran, 351-53.

distinct from other “neo-Romanesque” architecture of the period that aimed at deliberate imitation of Romanesque forms or as working within the classical traditions.<sup>35</sup> Introduced by Heinrich Hübsch in 1828, the theory caught on quickly. By the 1840s “the official German architectural world was dominated by the new *Rundbogenstil*,” as Lewis observes, “[and it] had become enshrined in the programs of most German architectural academies.”<sup>36</sup> Physically, buildings of this style were characterized by the dominance of the round arched opening, executed in the preferred materials of unstuccoed brick or in local sandstone or limestone. Simple geometric forms and smooth surfaces were left unobstructed by ornament, which was restricted to bordering areas and most often Romanesque or Byzantine in inspiration. Proponents of the *Rundbogenstil* created their own book of plans, the *Entwürfe zu Kirchen* (Designs for Churches), first published in 1844 with later editions issued in the 1850s. While it is unknown if the *Entwürfe zu Kirchen* influenced the American Congregationalist Convention when they published their own *Book of Plans*, it indeed was “significant in that it was the major means of transmission of the Prussian ecclesiastical *Rundbogenstil* to America, especially in the years around 1846-1855.”<sup>37</sup>

When the *Rundbogenstil* reached American shores, being transported “between a climate of highly theoretical discourse,... [to] an architectural milieu that was only beginning to be professionalized,” it was immediately transformed.<sup>38</sup> “The theoretical basis of the *Rundbogenstil*,” as Curran observes, “seems to have been of little consequence to the American architect or builder.”<sup>39</sup> The loss of German theory in America manifested primarily in two ways:

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<sup>35</sup> Ibid, 357.

<sup>36</sup> Lewis, *The Politics of the German Gothic Revival*, 59.

<sup>37</sup> Curran, 364.

<sup>38</sup> Ibid, 366.

<sup>39</sup> Ibid, 366.

first in the superficial application of round-arched openings and other Romanesque detailing, and second in the introduction of non-Romanesque forms, particularly spires, borrowed from Gothic architecture. In *City and Suburban Architecture*, Samuel Sloan discusses this round-arched style, justifying its appropriateness for use in ecclesiastical buildings.<sup>40</sup> In his focus exclusively on the round arch as an element that “decorated temples” and an alternative to the pointed arch, he reveals the American indifference to the structural theory inherent in the *Rundbogenstil*. The very nature of Hübsch’s original theory may have allowed the latitude for eclecticism, as Lewis explains:

A doctrine so loosely formulated required discipline on the part of designers, for it could be interpreted as giving complete license, and sanctioning any kind of eclectic combination of forms... A new kind of *Rundbogenstil* architect now appeared, less interested in the interplay of structural elements, and endlessly fascinated by the interplay of different stylistic forms.”<sup>41</sup>

In the United States, emigrant architects trained in Germany, such as Collins, and mid-nineteenth-century American architects, such as McArthur, alike took part in the fundamental theoretical change to the *Rundbogenstil* style. The American influence on the style, according to Curran, warrants the distinct label – the American “round-arched style.”<sup>42</sup>

### **The Background of McArthur’s Steepled Churches**

McArthur’s round-arched buildings of his early career are decidedly *Rundbogenstil*, in the sense that they are meant to look modern, rather than Neo-Romanesque, attempting to appear as ancient specimens of the Romanesque. This is particularly true of his designs for

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<sup>40</sup> Samuel Sloan, *City and Suburban Architecture; Containing Numerous Designs and Details for Public Edifices, Private Residences and Mercantile Buildings Illustrated with One Hundred and Thirty-six Engravings, Accompanied by Specifications and Historical and Explanatory Text* (Philadelphia, PA: J.B. Lippincott & Co., 1859), 90-91.

<sup>41</sup> Lewis, *The Politics of the German Gothic Revival*, 60.

<sup>42</sup> Curran, “The German Rundbogenstil,” 351.

Tenth and First Presbyterian. It is not difficult to see the relationship between facets of McArthur's designs and the German *Rundbogenstil* through comparison with some of the seminal structures in Germany, as well as some early examples in the United States, with which McArthur was presumably familiar. The two different forms of the church buildings, both urban and suburban, are rooted in examples from the *Rundbogenstil*. The forms of the separate elements of the church buildings, including their bodies, towers, pinnacles, belfries, and ornamentation are also rooted in *Rundbogenstil* examples, both built and conveyed through the *Entwürfe zu Kirchen*. Finally, the spires of the church buildings, which are foreign to the *Rundbogenstil* language, illustrate that architects working in the American Round-Arched Style were departing from *Rundbogenstil* principles by looking to the Gothic for the forms of their spires. McArthur, under the influence of Edward Collins, designed two church buildings that illustrate the transformations between German *Rundbogenstil* and the American Round-Arched Style.

The inception of McArthur's steepled church buildings begins in 1852, when there was a religious revival in full swing within the Reformed Protestant sects, and established congregations were bursting at the seams with new congregants. Many churches became so crowded that at Sabbath meetings, there was only room for rent-paying pew-holders, leaving no room for visitors, which was antithetical to the evangelical mission of the congregations. The only solution was to build more churches and bigger churches. In January 1852, the Tenth Presbyterian congregation in Philadelphia, of which McArthur was a member, came to the conclusion that a colony church was in order. By June of that year, the Tenth Presbyterian congregation had successfully secured a lot in the Rittenhouse neighborhood for the new church building, which would be named the West Spruce Presbyterian Church (Fig. 13), only later

assuming the name of the mother congregation.<sup>43</sup> The important commission came to McArthur's office along with a second project for another growing congregation: the Wylie Memorial Church, or First Reformed Presbyterian Church on the 300 block of Broad Street (Fig. 14). It was around this same time that the partnership between McArthur and Collins dissolved, but not before Collins' *Rundbogenstil* influence had found its way into the church designs on McArthur's drawings boards. As early as December 1852, McArthur had presented the Trustees with a sketch of "the front of a church with a steeple."<sup>44</sup>

Little more than six months after starting his design for Tenth Presbyterian, McArthur was contacted by a smaller congregation about 30 miles down the Delaware River in Salem, New Jersey, to design a new church building to house their growing congregation.<sup>45</sup> By the summer of 1853 the drawings for First Presbyterian (Fig. 15) were also in progress, and as initially conceived, they did not include a steeple. The cornerstone was laid on July 17, 1854.<sup>46</sup> Construction drew out for more than two and a quarter years and was not completed until October 1856; at some point during the construction of First Presbyterian, the congregation made the decision to add a steeple to the design, possibly explaining the unusually long construction duration.<sup>47</sup> The result may have been much like his design for the First Presbyterian Church of Frankford (c. 1859, Fig. 6), had it not been for the addition of the steeple.

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<sup>43</sup> Rev. Alfred Nevin, *History of the Presbytery of Philadelphia, and of the Philadelphia Central* (Philadelphia, PA: W.S. Fortescue & Co., 1888), 334.

<sup>44</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, Philadelphia, Pennsylvania, 1852-1855, Papers of the Tenth Presbyterian Church, Philadelphia, PA.

<sup>45</sup> Gibbon, *History of the "First Presbyterian Church" of Salem. N.J.*, 15.

<sup>46</sup> "The Corner Stone of the new edifice..." *West Jersey Pioneer*, July 22, 1854.

<sup>47</sup> Minutes of the Board of Trustees, First Presbyterian Church of Salem, New Jersey, 1821-1920, Papers of the First Presbyterian Church of Salem, New Jersey.



By the summer of 1854, designs for Tenth Presbyterian were complete and the Trustees had hoped to have broken ground by then. However, the city of Philadelphia was in the throes of a local economic crisis that had been worsening since February when the city was consolidated to include the outlying districts. Crime and gang activity around the perimeter of the city had escalated to the point that the State intervened and enacted the Act of Consolidation of 1854.<sup>48</sup> The result for Philadelphia was crippling. Faced with an “extraordinary scarcity of money, coupled with extravagant prices for every kind of labor and building materials,” the construction was put on hold for almost a year.<sup>49</sup> <sup>50</sup> When the economic crisis in Philadelphia relented, the Trustees of Tenth Presbyterian awarded the construction contract for the church building to McArthur’s uncle, John McArthur (senior). As soon as the ground thawed in the spring, construction started, and the cornerstone was laid by April 26, 1855.<sup>51</sup> The McArthurs made a dynamic team, and “working at great speed,...[they] had the entire structure of the new church standing and roofed by the end of 1855.”<sup>52</sup> John Jr.’s performance on the project garnered the respect and honor of the congregation. He was elected as a Trustee of the newly formed congregation, appointed as Architect of the Church in preparation for construction, and was ordained as a Deacon before the church building was completed.<sup>53</sup> <sup>54</sup> <sup>55</sup> The congregation went so far as to appoint a committee “to inquire and report what testimonial

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<sup>48</sup> Andrew Heath, “Consolidation Act of 1854,” *The Encyclopedia of Greater Philadelphia*, 2013, <https://philadelphiaencyclopedia.org/archive/consolidation-act-of-1854/>.

<sup>49</sup> *Making God’s Word Plain*, ed. Boice, 54.

<sup>50</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, Philadelphia, Pennsylvania, 1852-1855, Papers of the Tenth Presbyterian Church, Philadelphia, PA.

<sup>51</sup> Nevin, 334-5.

<sup>52</sup> *Making God’s Word Plain*, ed. Boice, 54.

<sup>53</sup> Nevin, 334.

<sup>54</sup> Minutes of the Session of the 10<sup>th</sup> Presbyterian Church of the City of Philadelphia, 1830-1858.

<sup>55</sup> Nevin, 335.

can be presented to Mr. J. McArthur in consideration of the very satisfactory manner in which he has fulfilled contract in the erection of the building.”<sup>56</sup>

The new church buildings of First Presbyterian and Tenth Presbyterian were dedicated only a few months apart, on October 15, 1856 and January 4, 1857, respectively.<sup>57 58</sup> These two church buildings were conceived and designed within a few months of one another, and together they represent a moment of adaptation and experimentation in the career of John McArthur Jr. As his designs for the church buildings overlapped, the sequence of events evidences that his design for the smaller First Presbyterian steeple was derivative, an adaptation, from his design for the larger Tenth Presbyterian steeple. He designed Tenth Presbyterian to be the tallest structure in the city, accomplishing that feat by means of a 130’ masonry tower and belfry, surmounted by a 120’ wood-framed spire.<sup>59</sup> He then, for the smaller church building, scaled the Tenth Presbyterian steeple design down and modified the spire box framing to create a belfry of wood rather than masonry. It can be assumed that McArthur arrived at this solution in order to accomplish the congregation’s architectural goal, while attempting to work within the budget of the rural community that was, by comparison with the Philadelphia congregation, of limited means. It was well understood that in the United States, “the long prevalent use of wood for purposes of building” was employed as a means to reduce the construction costs of buildings. The Congregationalist Convention, in their Book of Plans, strongly advocated against the use of wood for church construction due to its impermanence,

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<sup>56</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, 1857-1894.

<sup>57</sup> Gibbon, *History of the “First Presbyterian Church” of Salem. N.J.*, 16.

<sup>58</sup> Thompson Westcott, *Guide Book to Philadelphia: A New Handbook for Strangers and Citizens* (Philadelphia: Porter and Coates, 1875), 277.

<sup>59</sup> *Insurance Survey No. 23414 – West Spruce Street Presbyterian Church*, by D.H. Flickwin, Surveyor (Philadelphia, October 20, 1855).

making the argument that “the necessary expenditures for the painting and repairs of a wooden building will soon exceed the overplus of cost incident to the use of stone.”<sup>60</sup> Nonetheless, McArthur proceeded with the design of the wooden belfry at First Presbyterian – an inexpensive rendition of his masonry *Rundbogenstil* tower of Tenth Presbyterian. McArthur’s adaptation of his larger design, in terms of scale and materials, is emblematic of the eclectic way American architects were adapting the German *Rundbogenstil* into the American Round-Arched Style.

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<sup>60</sup> Central Committee, 20.

## Chapter 4: The Architecture of McArthur's Steepled Churches

### A Note on Coloration

Before looking at the forms of the two church buildings, it is first important to understand that, because of changes to the exterior finishes, the church buildings do not currently retain their original intended appearance. Originally the church buildings combined brick and brownstone with cementitious renders and sand-painted wood elements designed to imitate stone – the intended monochromatic effect was perhaps that of European stone church buildings, with their poetic smoky spires. McArthur's Tenth Presbyterian was of unpainted red brick, which, amongst these newly erected Round-Arched style church buildings, was perhaps most common.<sup>1</sup> Brick was popular as it lent itself well to the *Rundbogenstil* tendency toward simple walls, sharply cut openings, and for clearly articulated geometric massing.<sup>2</sup> The use of brick to create simple sharp openings at Tenth Presbyterian is more apparent in the fenestration of the sidewalls and tower; the openings of the main façade are heavily articulated, and somewhat obscured, by pilasters and door surrounds. According to MacArthur's specifications for the building, "all outside [wood] ornaments, window and door frames, cornices, &c., must have two coats of sand and made to imitate Connecticut freestone."<sup>3</sup> The original, nearly monochromatic, brick and "brownstone" appearance, visible in the earliest known photograph of the church building (Fig. 16), accomplished the Romanesque aesthetic of the Round-Arched style. McArthur's First Presbyterian in Salem, New Jersey (Fig. 17), also in a monochromatic palette, was of brick finished in a render colored to imitate brownstone. Wood elements of the

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<sup>1</sup> Steege, 223.

<sup>2</sup> Pierson, 230.

<sup>3</sup> John McArthur, Jr., "Contract and Specifications for the Erection of a New Church Building and Its Appurtenances, for the West Spruce Street Presbyterian Congregation," (Philadelphia, PA: J. Craig, 1855), 12.

church building, including the steeple and trim on the body of the church, were painted and sanded to imitate brownstone. Wood painted and sanded per McArthur's specifications was a bit of an offense against the concept of truth in materials, as it was made to conceal its true nature and make it appear to be stone. Daggett and other writers of the period, addressing the topic of church construction, placed an emphasis on truthfulness of materials as not only a design but also an ethical principle, arguing that allowing materials to appear as they are plays a role in educating the public about beauty and taste.<sup>4</sup>

Nonetheless, in spite of critical disfavor, McArthur used it both for Tenth and First Presbyterian in order to create the Romanesque aesthetic he sought. The imitation "sandstone" wood at both church buildings has long been painted over, resulting in very different appearances. Since at least the early 1980s, the trim of Tenth Presbyterian has been painted a light, off-white color, approximating the look of limestone (Fig. 18). This color, combined with the field of the red brick, gives the building much more of a Lombard Romanesque appearance, similar to St. Ambrogio in Milan, Italy (Fig. 19). First Presbyterian's imitation "sandstone" too has been painted over, in this case with stark white (Fig. 20). The whitewashing of First Presbyterian is not unusual; as Steege observes, "many of these buildings were originally painted gray or light tan in imitation of stone, but most have by now been covered with white to satisfy subsequent classical revival tastes. The original picturesque character is thus obscured, making the buildings in many cases appear to a casual observer to be traditional New England meetinghouses."<sup>5</sup>

Contemporary with First Presbyterian's design, the *Book of Plans* nearly anticipated the eventual

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<sup>4</sup> Gwen W. Steege, "The 'Book of Plans' and the Early Romanesque Revival in the United States: A Study in Architectural Patronage," *Journal of the Society of Architectural Historians*, Vol. 46, No. 3 (September 1987), 220.

<sup>5</sup> *Ibid*, 225.

outcome and cautioned “To paint it white would be well nigh to ruin its proper effect.”<sup>6</sup> (plans, 33)

### **The Architecture of the Tenth Presbyterian Church, Philadelphia**

Design XIII in the Book of Plans (Fig. 11) presents a model for an urban church building, much like McArthur’s Tenth Presbyterian. In the German book of plans, the *Entwürfe zu Kirchen*, a typical arrangement presented for a city church building was for it to be twin-towered. McArthur tends more toward the German model of the twin-towers, flanking the main façade of the church building. But by making the towers unequal, with one principal tower to the east, and one small tower to the west, he meets the taste for the Romantic that was popular. Also, he situates the principal tower at the corner of the property, anchoring the church building at the intersection of two streets. Lastly, while the tower illustrated in Design XIII was described as massive, with a base nineteen feet square at the base, excluding the buttresses, and with the spire at one hundred and seventy-six feet high, it would have been dwarfed at less than three-quarters the size of Tenth Presbyterian.<sup>7</sup> McArthur’s tower, with a base of about twenty-four feet square, and a height of 248 feet, is nearly unrivalled in scale by designs in pattern books.<sup>8</sup> Despite the immense scale, McArthur’s design fit in well to its urban setting. Although the principal tower, with its enormous spire, was basically Gothic in its configuration, the round-arch openings are clearly Romanesque.

Apart from the towers, McArthur seems to have relied on the *Entwürfe zu Kirchen* for his design of the façade of the church building. The façade, resembling in some ways August Soller’s

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<sup>6</sup> Central Committee, 33.

<sup>7</sup> *Ibid*, 44.

<sup>8</sup> *Insurance Survey No. 23414 – West Spruce Street Presbyterian Church*, by D.H. Flickwin, Surveyor (Philadelphia, October 20, 1855), 1.

*Michaelskirche* (1845) in Berlin (Fig. 21), seems to take cues not in overall arrangement, but as a *Rundbogenstil* design in its synthesis of Renaissance and antique forms (round arches) with medieval ones (brick wall and an essentially medieval ornamental vocabulary).<sup>9</sup> The fenestration in the upper story is very similar to *Michaelskirche*, and typically Norman, grouped in triplets with the center windows higher than the flanking ones; the principal difference lay in McArthur's spacing of the windows, where he inserts panels with Lombard bands in place of Soller's narrow pilasters.<sup>10</sup> The two facades also share prominent Lombard bands at the corbel tables, belt coursing of Byzantine-inspired motifs, and paneled corner pilasters that terminate the gable slopes. His handling of the façade indicates that McArthur intended the building to convey the German *Rundbogenstil*.

Tenth Presbyterian's masonry tower with belfry was a recognizable adaptation of the towers of Friedrich von Gärtner's *Ludwigskirche* in Munich. Gärtner, the leading practitioner of the *Rundbogenstil* in southern Germany, intended the *Ludwigskirche* to be modern and a-historicist, conveying "a progressive, improved, 'purified' Romanesque, continuing where the historical *Rundbogenstil* left off."<sup>11</sup> Constructed between 1829-44, the *Ludwigskirche* was published in the *Entwürfe zu Kirchen* in 1844. Based on the striking similarities with the tower of Tenth Presbyterian (Fig. 22), it might be assumed that Collins either took the lead on the design of the tower from memory or sketches in notebooks, or he had brought a copy of the *Entwürfe zu Kirchen* with him to Philadelphia. Curran explains that, while it is impossible to measure the degree to which American architects understood the *Rundbogenstil*, it is possible to identify

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<sup>9</sup> Curran, 365.

<sup>10</sup> Frank Wills, *Ancient English Ecclesiastical Architecture and Its Principles, Applied to the Wants of the Church at the Present Day* (New York, NY: Stanford and Swords: 1850), 17.

<sup>11</sup> Curran, 357.

direct knowledge of the *Rundbogenstil* in examples of their work.<sup>12</sup> Tenth Presbyterian, particularly the principle tower, is one such example of McArthur employing that direct knowledge.

There is one particularly distinctive, and perhaps *Rundbogenstil*, feature of Tenth Presbyterian: a row of five rose windows, to which early references are made but no physical evidence remains. This row of rose windows, which brought light into the upper galleries of the church interior, ran along the upper story of the exterior walls. They are visible in an early rendering featured on a pew rental certificate that appears to have been issued to pew-renters before construction had even begun, probably based on a rendering from McArthur & Collins' office (c. Dec 1853, Fig. 13).<sup>13</sup> Two years later the rose windows for the gallery are mentioned in the specifications for the building as being "two and a half inches thick, hung to slide up in the wall."<sup>14</sup> Once again the row of "5 rose windows in open rafters or archivolt below the ceiling of white pine with perforated panels" is mentioned, complete with a tiny sketch, in an insurance survey prepared around the time that construction was substantially complete.<sup>15</sup> In October 1892, following interior "Byzantine" renovations by Frank Miles Day, the insurance survey was added to include a note that "the windows in auditorium are now in 4 lights each of 22 + 61 filled in with leaden sash and ornamental colored glass the rose windows on the galleries have also been treated in the same manner."<sup>16</sup> It is unclear if this note indicates that the windows themselves were changed to their current arched-top configuration, or simply reglazed. In any

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<sup>12</sup> Ibid, 370.

<sup>13</sup> The Trustees of the West Spruce Street Presbyterian Church Philadelphia, Pew rent certificate, c. December 1853.

<sup>14</sup> McArthur, "Contract and Specifications," 8.

<sup>15</sup> *Insurance Survey No. 23414*, by D.H. Flickwin, Surveyor (October 20, 1855), 1-2.

<sup>16</sup> *Insurance Survey No. 23414*, by Samuel Hillman, Surveyor (October 19, 1892), 6.



case, a photograph taken in 1895 (Fig. 9) clearly shows the gallery windows in the arched-top configuration that they retain today. There is no obvious sign that the exterior masonry walls were ever modified to accommodate a change from rose to arched-top windows. It remains unclear if the building was ever constructed to include the peculiar row of rose windows, or if it was a design intention that was never realized.

### **The Architecture of the First Presbyterian Church, Salem, New Jersey**

Just as Tenth Presbyterian fit the model of an urban church building, so did First Presbyterian as a village church. In the 1840s, a decade before McArthur was developing his plans for these church buildings, the concept of the village church, or chapel, was developing abroad and in America. The *Entwürfe zu Kirchen*, includes a village church, or *Dorfkirche*. In simple terms, the model for the village church was a rectangular building with a bell-cote placed in the center of the west façade at the peak of the gable.<sup>17</sup> Around this same time in the United States, the church building typology that would later become known as the “village church” was appearing in pattern books and in designs. The emerging American version differed from the German *Dorfkirche* in that, in place of a bell-cote, was a tower and steeple. And instead of the preference for the round-arch style, the American model was following the English in its preference for Gothic decoration. In some examples, the tower is incorporated within the footprint of the church building, as with First Presbyterian; in others, it projects either partially or wholly outside of the building. In these “gothic chapels,” we begin to see the basic form of First Presbyterian. Examples of these Gothic, or “Early English,” chapels in the work of other architects at the time include Thomas Ustick Walter’s duplicate Gothic Chapels (1850) and John

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<sup>17</sup> Curran, 365.

Notman's St. Paul's Church in Trenton, New Jersey (1851). Walter's two gothic chapels, the Freemason Street Baptist Church in Norfolk, Virginia, and the Gothic Chapel for Shanghai, China (Fig. 23) are the only known duplication in Walter's work. In the gothic chapels of Walter and Notman, the belfry is created within the masonry of the upper stage of the towers. Notman's version of the Gothic chapel is simplified, without the added verticality of pinnacles.

By the early 1850s, even before publication of the Congregationalists' *Book of Plans*, there was a distinct stylistic shift in the design of these small village churches: the *Rundbogenstil* aesthetic supplanted the Gothic Revival that had been popular since the beginning of the century. This shift toward the Round-Arched Style is illustrated very well in several village church designs published by Samuel Sloan throughout the 1850s. Samuel Sloan, who realized his influence as one of the most prolific American authors on architecture of the mid-nineteenth-century, published his first design for a village church in 1852 (Fig. 24), just before McArthur was commissioned for the design of First Presbyterian.<sup>18</sup> Author Frank Greenagle probably correctly observed that the likelihood is strong that McArthur followed Sloan's plan for "a village church" though it is a substantially larger building and much taller steeple.<sup>19</sup> The church building, described by Sloan as "after the Romanesque style," but retaining "the general outline and plan usual in this country as being the best adapted to our present form of worship" is emblematic of the new trend at the time.<sup>20</sup> The two church buildings had the same basic form, with a similar square masonry tower, terminated in the same crenellation, and topped by a wood steeple. The

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<sup>18</sup> Samuel Sloan, *The Model Architect: A Series of Original Designs for Cottages, Villas, Suburban Residences, Etc. Accompanied by Explanations, Specifications, Estimates, and Elaborate Details Prepared Expressly for the Use of Projectors and Artisans Throughout the United States* (Philadelphia, PA: E.S. Jones & Co., 1852), Plate LXXVII.

<sup>19</sup> Frank L. Greenagle, *The New Jersey Churchscape: Encountering Eighteenth- and Nineteenth-Century Churches* (New Brunswick, NJ: Rutgers University Press, 2001).

<sup>20</sup> Sloan, 82.

primary difference between the two designs is that McArthur terminates the tower just above the roof, thus eliminating the upper stage of the tower with its biforiated windows. Otherwise, the fenestration in the two church buildings is nearly identical; the principal difference lay in McArthur's choice for an understated entrance at the ground level and the substitution of a large biforiated window at the sanctuary level. The pinnacles, which Sloan refers to as finials, of the two church buildings are also nearly identical, punctuating the corners of the building and masonry tower. The steeple of both designs, as Sloan describes, "is entirely constructed of wood, and crowned with a spire and finial."<sup>21</sup> However, by extending the lines of the spire framing, the structural difference between these two steeples is readily seen – Sloan's spire sits atop of the belfry framing, in a stacked-box-frame configuration, while the framing of McArthur's very attenuated spire extend through the belfry and down into the masonry tower below.

### **The Architectural Commonalities in McArthur's Steepled Churches**

McArthur's Tenth Presbyterian and First Presbyterian are very different in terms of their scale and context; Tenth Presbyterian is a massive church building in an urban setting, and First Presbyterian is a modest church building in what would be considered a suburban, or "village," setting by nineteenth-century standards. However, for all of their differences, the steeples of Tenth and First Presbyterian bear a striking resemblance to one another (Fig. 25) – this is explained by McArthur's use of his earlier design for Tenth Presbyterian as a model and prototype for his subsequent design of First Presbyterian. Integral with their steeples, the church buildings share features in their towers, pinnacles, and spires. And each of these

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<sup>21</sup> Sloan, 83.

elements, emerging through the American Round-Arched Style, can be seen as either growing out of the *Rundbogenstil*, or, in the case of the spires, diverging from it.

By the late 1840s in America, increasingly tall spires were becoming part of the prescription for church architecture, with authors like Oliver Daggett advocating for spires as necessary and “distinctively religious architectural features.”<sup>22</sup> The growing ambitions of congregations were reflected in the exteriors of their new church buildings, and the materials, the height of spires, the scale were all chosen by the building committee.<sup>23</sup> In the case of Tenth Presbyterian, the ambitions of the urban congregation were apparently grand. However, prototypes for spires of the slenderness and height that suited the Romantic fashion of the time were not to be found in the Romanesque or *Rundbogenstil* architectural vocabulary. It is at this point that we begin to see architects in America, both emigrants and native-trained, looking to Gothic precedents for inspiration for their spire designs. The *Runbogenstil* was, at the core of its principles, a reaction to the Classical and Gothic Revivals that were prevalent at the time; to its German proponents, the round arched style offered a building system that avoided the extremes of the Greek and the Gothic.<sup>24</sup> Thus, the incorporation of spires based on Gothic aesthetics onto buildings in the Round-Arched Style represented a bit of a contradiction, or movement from the founding principles of the *Rundbogenstil* and toward mid-nineteenth-century eclecticism. For architects working in the United States, however, this eclecticism was easier to justify, “where the German debates were almost completely unknown, than it would have been in Germany, where having a foot in both camps would have been more

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<sup>22</sup> Steege, 219.

<sup>23</sup> Holliday, 71.

<sup>24</sup> Curran, 366.

problematic.”<sup>25</sup> Another factor in the growing heights of American spires is the difference in construction materials and methods from European spires. As Michael Lewis points out, “German spires like to go up in masonry as tall as they can; our architects think like carpenters.”<sup>26</sup> Where European builders of the middle-ages were limited in height by their use of stone, American architects were liberated by the lightness and workability of wood framing. “Though it is idle to think of imitating in our small, and especially in our wooden structures, the imposing dignity of Cathedral architecture,” wrote the authors of the *Book of Plans*, American architects such as McArthur constructed wood spires in spite of critical skepticism.<sup>27</sup>

McArthur’s spires for Tenth and First Presbyterian, while of different sizes, are effectively identical in materials and detailing and can be treated as one with respect to architectural analysis. Both spires draw from the Gothic, perhaps through the filter of Gothic Revival architecture in the United States (Fig. 26). McArthur’s spire for Tenth Presbyterian was a striking transcription of Minard LaFever’s Holy Trinity Episcopal Church in Brooklyn, New York (constructed 1847, published 1856). Construction of Holy Trinity was completed in 1847, but it was not published until 1856 when LaFever featured it in his book *The Architectural Instructor*, so it is unclear whether or not McArthur was directly familiar with this design. If he was, he certainly would have been interested in the significant height of LaFever’s construction, reported to stand at 275 feet, 27 feet taller than McArthur’s spire.<sup>28</sup> In any case, apart from

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<sup>25</sup> Holliday, 64-65.

<sup>26</sup> Lewis, correspondence to author, August 8, 2019.

<sup>27</sup> Central Committee, 36.

<sup>28</sup> Minard LaFever, *The Architectural Instructor, Containing A History of Architecture from the Earliest Ages to the Present Time; Illustrated with Nearly 250 Engravings of Ancient, Mediaeval, and Modern Cities Temples, Places, Cathedral, and Monuments; also the Greek and Early Roman Classic Orders, Their Principles and Beauties; with a Large Number of Original Designs of Cottages, Villas, and Mansions of Different Sizes, Accompanied with Practical Observations on Construction, with All the Important Details, on a Scale Sufficiently Large and Definite to Enable the Builder to Execute with Accuracy: and Further*

LaFever's Gothic decoration at the transition from the tower, the similarities are striking. Both spires have the same configuration: an octagonal spire rising from a base with small projecting gables on the four principal sides, with each side having a roundel in the gable. The four diagonal sides of the octagon are topped with pinnacles, which sit on the pilasters of the masonry belfry below. Both spires are shingled, with plain ribs at the angles. Though using round-arches instead of pointed arches, McArthur's fenestration of the spire is identical to LaFever's rows of spire-lights, which alternate between principal and secondary sides of the spire. The overall effect of these spires is Gothic, seemingly reminiscent of the medieval Old Saint Paul's Cathedral in London (c. 1314), before its destruction by fire in 1666. The primary difference that these nineteenth-century spires exhibit from their Gothic prototype is that they are much more slender in proportion, and their framing members extend from within the masonry towers. The precise structure of Old Saint Paul's is not known, but based on renderings, it appears to have been a broach spire in which the framing members sprung from the masonry tower without an intermediate parapet. The overall effect of McArthur's attenuated spires is decidedly Gothic, and epitomizes the way in which the American Round-Arched Style had departed from the German *Rundbogenstil*.

While his design for Tenth Presbyterian was well underway, McArthur set out to add a steeple to his modest design for First Presbyterian in Salem, New Jersey. His steeple design for Tenth Presbyterian provided an easy starting point for his design for the smaller church building. However, probably due to the limited financial resources of the suburban congregation,

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*Designs of Churches, Monuments, and Public Buildings; Together with a Glossary of Architectural Terms: the Whole Being the Result of More Than Thirty Years Professional Experience* (New York: G.P. Putnam & Co., 1856), 478.

McArthur modified the design to recreate the masonry belfry, reminiscent of the *Ludwigskirche*, in modest wood framing and cladding. In order to accomplish this, McArthur capitalized on the framing system already employed in the spire construction – a telescoping box frame – and extruded the lowest box frame beyond the exterior of the spire rafters. This created a unique use of rigid box frames as a sort of internal armature, taking the loads imposed on the architectural exterior and moving them inward and down.<sup>29</sup> In McArthur’s adaptation of form based on material limitations, he is much like the German architects, “practicing in the round-arched *Rundbogenstil* style...[who] added materials, construction, and technology as factors shaping architectural form, and thereby shifted the search for architectural form from idealist to materialist concerns.”<sup>30</sup>

The examination of McArthur’s steeples raises an additional question. If McArthur’s steeple designs were influenced by his early partner, Collins, then are steeples designed by Collins different? And what does that tell us? A steeple for comparison, designed a few years later under Collins subsequent partnership, Collins & Autenrieth, is that of the *Deutsche Evangelisch-Lutherische Emanuelskirche*, or Emmanuel Evangelical Lutheran Church (1868), in Philadelphia (Fig. 27). The bodies of Collin’s Emmanuel Lutheran and McArthur’s First Presbyterian are strikingly similar and decidedly *Rundbogenstil*. Both designs also draw on Gothic inspiration for their steeples, though this is the primary aspect in which the two buildings differ. The primary difference in the steeples is the stylistic source that the two architects drew inspiration from; McArthur drew on the English Gothic (Fig. 26), Collins unsurprisingly drew from a German Gothic prototype. Collins’ borrowings from the Cathedral at Gelnhausen, Germany,

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<sup>29</sup> Jan Lewandoski, correspondence to author, March 4, 2019.

<sup>30</sup> Lewis, *The Politics of the German Gothic Revival*, 56.

are obvious (Fig. 28). Collins created a multigabled wooden belfry to resemble the multigabled masonry towers at Gelnhausen. This tells us that Collins, in his use of a spire of German origin, remained somewhat truer to the principles of the *Rundbogenstil* in his design of Emmanuel Lutheran. However, both McArthur and Collins, one American-trained and the other emigrant, were adapting the German *Rundbogenstil* into the American Round-Arched Style through by adding gothic-inspired steeples to their designs.



## Chapter 5: McArthur's Framing System in the Context of Steeple Design

### Timber-Framing vs. Wood Framing

It should be noted that, while the title of this thesis indicates “wood framing,” McArthur's steeple framing, for the most part, constitutes heavy-timber framing. Heavy-timber is defined as solid sawn lumber measuring 5-1/2” or more in their smallest cross-sectional dimension.<sup>1</sup> The wood members that comprise the First Presbyterian steeple range in dimension accordingly, diminishing in section in the higher portions of the steeple. The largest beams, pocketed deep into the masonry tower at the base of the framing, measure 11-1/2” by 16-1/2”, and are defined as heavy-timber. The spire principals, or rafters, however taper as they rise – measuring 5-3/4” x 6-3/4” at their feet, and diminishing to small dimensional lumber at the apex of the spire. In addition to the distinctions of wood member dimension, timber-framing and wood-framing are also differentiated by their means of connection. The steeple of First Presbyterian, typical of mid-nineteenth century timber structures, is joined through a combination of mortise and tenon connections and iron straps, rods, bolts, and spikes.<sup>2</sup> Wood-framing, contrastingly, is generally fastened by nails – advances in nail manufacturing made possible the balloon-framing system.<sup>3</sup> In the case of the First Presbyterian steeple, the use of nails is not structural, but is limited to cladding and shingles. Because the spire principals and bracing are, on average, smaller than 5-1/2” in their smallest dimension, I have chosen to refer to the structure as “wood-framed,” as opposed to “timber-framed.” This distinction, however, is

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<sup>1</sup> “Solid-Sawn Heavy Timber,” Canadian Wood Council, <https://cwc.ca/how-to-build-with-wood/wood-products/mass-timber/solid-sawn-heavy-timber/>.

<sup>2</sup> Jan Lewandoski, correspondence to author, March 4, 2019.

<sup>3</sup> Daniel J. Boorstin, *The Americans: the National Experience*, (New York: Random House, 1965), 148.

technical and the large scale of these wood structures should not be misunderstood as dimensional lumber framing systems, such as balloon framing (Fig. 29).

### **The Structural Context of American Steeple Framing**

For the hundreds if not thousands of church edifice designs illustrated in builders' guides and pattern books throughout the nineteenth-century, there are approximately a half-dozen sections illustrating the structure within steeples. Moreover, while designs for churches called for ever higher steeples, they rarely depicted these steeples structural systems or explained how they might be built. Many of the wood-framed steeples constructed between the 17<sup>th</sup> and nineteenth centuries in the United States have been destroyed, the casualties of deterioration, structural failure and fire. Beyond the physical loss of the actual structures, the record is obscured by the fact that few of the construction documents for these structures have survived. The steeples that do survive are exceedingly difficult to access and delineate, making the understanding of these complex structures even more difficult. Timber-structure restoration expert Jan Lewandoski, explains "there are 10s of thousands of tall wooden steeples,... with their framing hard to access and concealed from view, built by clever but unknown framers which we could never examine in several lifetimes."<sup>4</sup> The result is that the record of steeple framing is, at best, sparse. And, as far as can be determined, there were no patented designs for steeple framing, as there were for other wood structures such as bridge trusses and floor girders. Perhaps the difficulty of access and knowledge made protection of the structural designs by patent unnecessary.

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<sup>4</sup> Jan Lewandoski, correspondence to author, March 4, 2019.

In addition to the lack of documentation of how historic steeples were framed, there is also no general structural theory of steeples.<sup>5</sup> Despite the lack of a formal theory, there are general concepts about steeple framing methods that are accepted in the discipline. In simple terms, it is helpful to think of steeples as comprising some combination of box frames, either stacked or telescoping, and spire cones, most of which are octagonal (Fig. 30). Additionally, some steeples contain central masts, either supported like columns, or hung like pendulums, a method dating back at least to Sir Christopher Wren (1632-1723) and James Gibbs (1682-1754)<sup>6</sup> A common condition in wood-framed steeples is that they are supported unevenly, with one side bearing on the front wall of the church building, and the opposite side bearing on the first interior roof truss. This differential structural support often leads to deflection of the supporting truss, with the expected result that many roof-mounted church steeples lean back toward the nave when support is shared between an endwall and a less-stiff roof truss.<sup>7</sup> In the case of John McArthur, Jr.'s wood-framed steeples of Tenth and First Presbyterian, both are fully supported by square brick masonry towers and so this issue is not a factor in their construction or performance.

A classic example of a simple stacked box frame is the steeple structure of Christ Church (Fig. 30.A) in Philadelphia which comprises two stacked octagonal drums linked by tongues and k-braces, and topped by the spire cone.<sup>8</sup> A more complex method of steeple framing is seen in telescoping framing, which is a common practice worldwide in church buildings, temples and

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<sup>5</sup> Jan Lewandoski, correspondence to author, March 2, 2019.

<sup>6</sup> Jan Lewandoski, "Restoration/Repair of Steeples," (lecture, Association for Preservation Technology, Philadelphia, PA, March 2, 1996).

<sup>7</sup> Jan Lewandoski, "Historic American Timber-Framed Steeples: V. Engineering a Steeple Restoration," *Timber Framing* 89 (September 2008), 18.

<sup>8</sup> Joseph Hammond, "Timber Frame Engineering of Robert Smith: Leading Builder/Architect of Colonial America," (lecture, Association for Preservation Technology, Philadelphia, PA, March 2, 1996).

other tall wood structures in which tall exposed frames interpenetrate the wood frames or masonry stages below them. Wood frames often drop 12 to 16 feet into the frames below them, lending them excellent resistance to wind loads. Lewandoski emphasizes their advantage: Lewandoski notes that steeples without some degree of telescoping among the frame stages are rare, possibly because of the high tendency for those stages to be blown off by calamitous winds in the absence of some other anchoring measure or a benign topographical location.<sup>9</sup> The assumption that the superior performance of telescoping framing over stacked framing represents an evolution of technology, however, can't be proven due to the lack of documentation of steeples worldwide.<sup>10</sup>

Castleton Federated Church in Vermont combines deep telescoped framing with a pendulum-mounted central mast (Fig. 30.B). Richard Upjohn's design for a "Wooden Church" presented in *Rural Architecture* (Fig. 30.C) shows a very rudimentary framing system, which is appropriate for this modest structure with a steeple height of only thirty-five feet. Samuel Sloan's design for the First Presbyterian Church of Kensington (Fig. 30.D) employs a basic stacked frame, modified with an external skirt of framing used to support an elaborate multi-stage pedestal. The obvious structural shortcoming of this system is that the primary load path of the bulky frame is directed to the weakest point of the supporting roof truss. This was likely to have caused deflection of the truss and subsequent backward listing of the steeple, and possibly explains why at some point the lantern and spire were removed and replaced with squat faceted onion dome.

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<sup>9</sup> Jan Lewandoski, "Historic American Timber-Framed Steeples: I. Middlebury, Vermont," *Timber Framing* 83 (March 2007), 20.

<sup>10</sup> Jan Lewandoski, correspondence to author, March 11, 2019.

### **McArthur's Steeple Framing System**

In a departure from traditional stacked or telescoping framing, in his design for First Presbyterian (Fig. 30.E), McArthur created an internal armature, using stacked box frames within which the spire cone is nested. McArthur's design for the church did not initially include a steeple, but during the course of design or construction, he added a steeple as a change order. At that point, McArthur already had the design for the larger steeple of Tenth Presbyterian on his drawing board. It appears that McArthur took the steeple design from the larger church building, including the upper portion of the masonry tower, pinnacles and all, and appropriated it for the smaller church building (Fig. 31). The difference in height between the wood-framed portions of the two steeples is approximately only 15-20 feet. In all probability, McArthur used the steeple framing design of Tenth Presbyterian on First Presbyterian, with little modification (Fig. 25), other than one notable change where he created the appearance of a masonry belfry by extruding the lower box frame to support the wood skin. It reveals an interesting moment in McArthur's career when he was experimenting, and economizing by adapting the same basic design to two different buildings. It is unclear how McArthur arrived at this internal armature structural design, or the extent to which framing like this was used in other structures. However, the available literature, which is remarkably sparse, was surveyed and a similar design was not identified. There are several aspects of this framing system that are unusual.

At First Presbyterian, three wooden timber frames emerge from the steeple's brick tower, each of the frames stacked upon each other and bound to those below by the spire principals, or rafters, as tension members, not by interpenetration of the frames themselves. While the stacked framing itself is normal for the period, the use of the spire principals to strap together the assembly of the wood frame in tension is remarkable. The spire principals descend

down the steeple, stabilized by partners, which form the top of each box frame, in a tic-tac-toe, or double-cross, grid in plan (Appendix B).<sup>11</sup> In McArthur's design, the spire principals were laterally braced at five points along their span: lower claspings beams of the belfry/tower frame, upper claspings struts of the belfry/tower frame, top beams of the belfry/tower frame, top beams of the lower spire frame, and top beams of the upper spire frame.<sup>12</sup> The slender 97-foot-tall spire principals are concealed by the belfry frame and, at their base are virtually buried in 24 ft. of timber work and masonry below. Typically, spire principals foot themselves on a square plate level at the base of the visible spire, either at the top of the masonry tower walls or of the belfry, and then are buttressed by a skirting roof.<sup>13</sup> It appears that here McArthur's ambitious goal was to build something very tall and unusually resistant to overturning. The box frames, claspings the spire principals, act as a sort of internal armature, transferring the lateral loads from the spire rafters taking the loads imposed on the architectural exterior.<sup>14</sup> Another atypical aspect of the steeple construction of First Presbyterian is that McArthur extruded the lowest box frame of the armature, beyond the limits of the spire cone, in order to create a wood belfry. The resultant belfry is not dissimilar to the belfry of Tenth Presbyterian, outside of the significant difference in scale, with the belfry of the Tenth being at least twice the size. In addition to taking cues from the form of Tenth Presbyterian, the wood belfry was sand-painted to give the appearance of sandstone, despite that it did not follow principles of honesty in materials that were prevailing at the time.

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<sup>11</sup> Watson & Henry Associates, *Steeple Assessment Report for First Presbyterian Church of Salem* (Bridgeton, NJ: Watson & Henry Associates, 1996), 5.

<sup>12</sup> *Ibid*, 6.

<sup>13</sup> Jan Lewandoski, "I. Middlebury, Vermont," 25.

<sup>14</sup> Jan Lewandoski, correspondence to author, March 4, 2019.

## The Real (Or Assumed) Structure of Tenth Presbyterian

McArthur's Tenth and First Presbyterian were commissioned, designed, constructed, and dedicated in an overlapping sequence over a five year period between 1852-1857. It is impossible to know exactly the interchange of information that occurred between the two projects as McArthur worked out their designs and saw them through to completion. The entire belfry of Tenth Presbyterian was masonry – the telltale sign is the placement of the tower pinnacles at the top of the belfry. Despite the difference in the material of the belfries, the steeples' visual similarities, identical proportions, and overlapping design and construction sequence strongly suggest that steeples both employed the same internal armature structural system (Fig. 25). The steeple of Tenth Presbyterian was demolished in 1912, leaving behind only two known photographs and few other clues as to the exact structure of its enormous steeple (Figs. 9 and 16). The configuration of the framing of Tenth Presbyterian's steeple cannot be verified, as drawings do not survive. The original specifications reference section drawings that have not survived; this is a clear indication that McArthur designed the framing, as opposed to leaving it to the discretion of the builder. The survival of the smaller steeple of First Presbyterian can shed light on some of the similarities, and differences, with Tenth Presbyterian, and subsequently on McArthur as an architect. As Lewandoski points out, we can surmise that "building to such great height and slenderness in an urban setting, where failure would be catastrophic, would call for an unusually good and perhaps innovative design."<sup>15</sup> The section included herein (Fig. 31) is conjectural based on the extant framing of the First Presbyterian steeple. The conjecture is that, effectively, Tenth Presbyterian's steeple was as if the entirety of

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<sup>15</sup> Ibid.

the First Presbyterian steeple were perched atop a 130' tall masonry tower. In his adaptation of the steeple design of one church building for use on the other church building, McArthur made some structural design decisions, some of which improved the performance, while others diminished it.

One such design decision was, to extend the lowest box frame into the masonry tower to a significant depth, presumably in both steeples. Architects and builders, faced with the challenge of how to anchor a very tall wood steeple down to an otherwise masonry building, devised various solutions and often relied on wood or iron anchorages extending into the tower. Lewandoski notes that,

While it is possible to conceal timber frame stages within the masonry, it is not often done, considered either unnecessary or a positive danger to the masonry walls in case of movement of the flexible timber frames under wind loading, or damage to the masonry if the timber elements burn. Nonetheless, merely tacking a 70-ft. spire to a wooden top plate laid in mortar on top of a typical 18 to 24 in. of brick or stone was rarely thought adequate. Other methods were employed to resist uplift and overturning.<sup>16</sup>

McArthur's solution to extend the timber box frame into the tower, effectively vertically cantilevering the steeple, was not typical because of the danger it poses to the masonry itself under extreme loading conditions; it is not a failsafe system. The performance outcome for the two steeples suggests that while this design approach worked well for the First Presbyterian steeple, it may have been problematic for the larger steeple of Tenth Presbyterian. At First Presbyterian, the base of the tower/belfry box frame is seated in the masonry tower over 14' below the top of the walls. The feet of the spire principals are seated closer to the top of the masonry walls at about 3' below. The depth of embedment of the timber frame provided for a

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<sup>16</sup> Jan Lewandoski, "Resistance to Uplift and Overturning In Timber-Framed Steeples," *Timber Framing* 112 (June 2014), 24.



significant amount of mass to bear on the base beams of the frame, in addition to the dead load of the steeple itself. In the long-term performance of the steeple at First Presbyterian, it is demonstrated that the load conditions of the steeple are adequate to resist overturning without damage to the masonry of the tower.

However, the difference in performance of this feature between the two church buildings rests in the height of the steeples, as well as their heights above grade. The heights of the features of the two steeples varied greatly with the steeple of Tenth Presbyterian taller at the top of the masonry tower by 65', at the midpoint of steeple frame by 74', and at the top of spire by 83'. These differences in height are extremely significant because windspeeds rise exponentially with increased height above ground. This means that with the steeple of Tenth Presbyterian at a much greater height above ground, wind loading on the structure would have been much higher. In looking at the history of the long term performance of the larger steeple, it can be surmised that the top of the masonry belfry incurred significant damage under extreme wind loading conditions. During the winter storm of 1912, with wind speeds recorded up to 96 miles per hour, the Tenth Presbyterian steeple incurred severe damage, ultimately resulting in its demolition from the building.<sup>17</sup> Within the year following the storm, the church curators reported that the wooden portion of the structure had been removed in far as the brick work and the top of the tower was enclosed with a temporary roof.<sup>18</sup> While not accomplished immediately, likely due to a dwindling congregation and lack of necessary funds to do so, the

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<sup>17</sup> "Summary of Storm's Work," *Philadelphia Inquirer*, February 23, 1912.

<sup>18</sup> Trustees Minutes, Tenth Presbyterian Church, Philadelphia, Pennsylvania, 1909-1945, Papers of the West Spruce Street Presbyterian Church, Presbyterian Historical Society, Philadelphia, PA, January 8, 1913.

congregation eventually demolished the 58' tall masonry belfry.<sup>19</sup> The removal of the masonry belfry, requiring significant effort, suggests that the masonry at the top of the belfry may have incurred damage during the wind event of the storm, due to McArthur's atypical embedment of the lowest timber frame.

Another design decision McArthur made was to create a tensioning system extending from the peak of the spire. In his design for First Presbyterian, the eight spire principals converge to a center spire post which extends approximately 58' down into the spire. McArthur's specifications for Tenth Presbyterian require that "The top of the spire, immediately below the finial, shall be of solid timber, with an octagonal tenon, around which the top ends of the principals must be bolted," indicating the same construction detailing at both steeples.<sup>20</sup> The intended function of the center spire post can be deduced from its original detailing. In McArthur's design for the First Presbyterian steeple, the bottom of the central spire post is connected by an original system of rods and straps which extends to tie-down beams another 31' lower within the steeple structure (Fig. 32).<sup>21</sup> Because the center spire post is bound down by an iron rod, its intended function can be understood as part of a larger tensioning system, as opposed to as a tuning mast in which case it would be hanging free.<sup>22</sup> Lewandoski explains that this type of tensioning system was the easiest and most common method to resist uplift and

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<sup>19</sup> Application for Permit for Additions, Alterations, Repairs, One-Story Structures, Frame Buildings, Bay Windows, Heaters, Boiler and Engine Foundations, etc., City of Philadelphia, Bureau of Building Inspection, Permit No. 723, February 4, 1922.

<sup>20</sup> John McArthur, Jr., "Contract and Specifications for the Erection of a New Church Building and Its Appurtenances, for the West Spruce Street Presbyterian Congregation," (Philadelphia, PA: J. Craig, 1855), 7.

<sup>21</sup> Watson & Henry Associates, 5.

<sup>22</sup> Jan Lewandoski, correspondence to author, March 4, 2019; Jan Lewandoski, correspondence to author, April 13, 2019.

overturning.<sup>23</sup> However, typically these tensioning system terminate to the masonry directly or to a timber let into the masonry; McArthur's tensioning system is less direct, terminating to a level of partner beams that transfer the load indirectly through the spire principals to the box frame and eventually to the masonry tower. Generally, these types of tensioning systems were an imperfect solution due to their tendency to develop slack with seasonal expansion and contraction. Longer tie-down rods were desirable as they bring the tie-down loads deeper into the structure; however, the longer the tie-down rods, the more slack would develop. As Lewandoski explains, the problem is exacerbated as a small increase in length in these vertical rods, combined with the fact that they offer no lateral stiffness, can allow substantial overturning to begin under wind loading, further stretching the rod or bending the eye-bolts at their points of attachment.<sup>24</sup> A 1913 condition assessment drawing of the First Presbyterian steeple offers direct evidence of this problem of slackening of the tensioning system over time where it is plainly noted "this rod is loose" (Fig. 33).<sup>25</sup>

Lastly, it seems that McArthur may have inadvertently created a design flaw in the spire principals of the larger steeple, a flaw that may have proved terminal for the structure's longevity. The feet of the spire principals at First Presbyterian were seated on wood beams approximately at the top of the brick masonry of the tower. As with most steeples, the end grain of the spire principals was supported by wood members with a horizontal grain orientation, such as a beam or sill plate, resulting in a favorable arrangement with respect to moisture wicking of the vertical members. However, in the case of Tenth Presbyterian, we learn of a very

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<sup>23</sup> Jan Lewandoski, "Resistance to Uplift and Overturning," 24.

<sup>24</sup> Ibid.

<sup>25</sup> Frank N. Kneas, "Steeple of the First Presbyterian Church of Salem N.J." (condition assessment drawing, Philadelphia, PA, August 29, 1913).

different arrangement. In his specifications for Tenth Presbyterian, McArthur requires that “granite flags eight inches thick must be built into the angles of the tower, to foot the principals of the spire upon.”<sup>26</sup> The specifications go on to describe the connection detail: “The lower ends of those in principal spire must be fitted into notches, cut in the granite blocks already mentioned, and secured by one inch and quarter round iron rods, extending through the sixth floor, as shown on the transverse section.”<sup>27</sup> The granite at the foot of the spire principals suggests that McArthur was concerned that the great weight of the enormous steeple would force the hard end grain of the principals into the softer side grain of a plate atop the masonry, resulting in crushing.

Opting to set wood members into pockets of stone is an extremely atypical practice since the feet of these principals will quickly rot in that pocket, as is seen with joists necessarily pocketed into the walls of masonry buildings.<sup>28</sup> With the feet of the principals already vulnerable to moisture wicking in this detail, the detail is made even worse by the wood members being perforated for the attachment of iron rods. This location on the steeple, directly under the skirting roof at the top of the belfry, would be prone to moisture entry through at the intersection of complex roofs and exceedingly difficult to access for repairs. This questionable detail raises the question as to where McArthur got this idea, and why the builder, his uncle John McArthur (senior) would not have cautioned him against it. Nonetheless, the indication that the specification gives us that the principals were connected to iron rods, an estimated 40’ to floor framing below, tells us about McArthur’s strategy for anchoring the colossal spire.

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<sup>26</sup> John McArthur, Jr., “Contract and Specifications,” 5.

<sup>27</sup> Ibid, 7.

<sup>28</sup> Jan Lewandoski, correspondence to author, April 13, 2019.

Because the spire, clad in wood shingles, would have been relatively lightweight, the weight of the spire alone could not be relied on to resist overturning at such height and high wind speeds. It appears that McArthur's strategy was to resist overturning by attaching the spire principals to the masonry tower through the use of long tensionable rods.<sup>29</sup>

### **The First Presbyterian Steeple: Performance and Longevity**

McArthur's design for the steeple of First Presbyterian, as an internal armature frame coupled with a tensioning system indicates that he was aiming for rigidity in the structure. But being slender and framed of timber allows this steeple to be somewhat flexible, with the benefits that swaying rather than breaking convey. This structural flexibility had implication in terms of its performance in wind, integrity of external cladding, and subsequent performance in resisting moisture penetration. A 1995 structural assessment performed in conjunction with repairs to the steeple indicates that the steeple is considered a "flexible building," as defined by the ASCE (American Society of Civil Engineers) based on the ratio of height to the horizontal dimension at the mid-height of the structure.<sup>30</sup> The belfry is formed by the upper half of a 40' tall timber box frame, the bottom half of which is nested in the brick masonry tower. Resultantly, the belfry is well-stabilized and relatively short compared to the spire above. The spire, however, is formed from tapering wood members that are 97' long, making the spire relatively flexible and prone to lateral movement. The connection point between these two components of the steeple comprise partner beams on either side of each principal, compressed by through-bolts. By the 1850s, through bolted connections were common in bridges roof

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<sup>29</sup> Ibid.

<sup>30</sup> Karin Reed, "ASCE Stand[ard]: Min. Design Loads for Bldgs & Structures," (engineering calculations, Watson & Henry Associates, December 22, 1995), 3.

trusses and were recommended in many builders guides of the period; McArthur's prior familiarity with and use of through bolted connections is evidenced in his design for a truss girder published by the Franklin Institute in 1849.<sup>31</sup> McArthur's use of this type of connection, consistent with construction practice of the period, was probably to simply clamp bearing wooden shoulders together.<sup>32</sup> However, perhaps unintentionally, the connections may function as moment connections, allowing the complex steeple framing to pivot at these connection points.

Whether it was McArthur's design intention or not, the flexibility in the structure nonetheless results in a dynamic structural relationship between the belfry and the spire above. The differential movement between these two components effects the structure's performance. In 1996, in conjunction with structural repairs to the steeple, Keast & Hood Engineers of Philadelphia analyzed the steeple as if it were a cantilever, supported at the top and bottom of the belfry. The results of the analysis determined that the moment and shear stresses were highest just at the top of the belfry frame at the juncture with the base of the exposed spire, with stresses almost six times greater than in the spire itself.<sup>33</sup> The increased moment and shear focused at the top of the belfry frame appears to have caused differential movement between the belfry and spire at this level. Consequently, joints in the skirting roof opened, and permitted excess water entry by wind-driven rain. The water infiltration, in turn, caused deterioration of critical structural members at that level, allowing even more movement in the structure, thus

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<sup>31</sup> "A New Truss Girder," *Journal of the Franklin Institute, of the State of Pennsylvania, for the Promotion of the Mechanic Arts; Devoted to Mechanical and Physical Science, Civil Engineering, the Arts and Manufactures, and the Recording of American and Other Patent Inventions (1828-1851)* Vol. 17, no. 1, (January 1, 1849): 16.

<sup>32</sup> Jan Lewandoski, correspondence to author, March 4, 2019.

<sup>33</sup> Keast & Hood Engineers, "Analyze Steeple as Cantilever Supported at Top & Bottom of Belfry," (structural calculation diagrams, May 31, 1996).

creating a textbook reinforcing feedback loop in the deterioration of the steeple. As early as 1913, a steeple assessment drawing prepared by an engineer from Philadelphia (Fig. 33), showed that significant deterioration had already occurred at this level of framing, due to leaks in the skirting roof.<sup>34</sup>

### **Divergent Outcomes for the Two Steeples**

It bears noting that McArthur's two steeples had parallel lives in terms of their deterioration, the repair campaigns that necessitated, and catastrophic damage incurred by storms (Fig. 34). A comparison of the records of both churches reveals that the congregations were faced with the same catastrophic damage caused by major storm episodes. By the late 1870s, the steeples were in their third decade and were beginning to suffer the effects of age, with Tenth Presbyterian recording damage including decaying timbers, loosening iron bolts, damage to the finial, and lightning strikes.<sup>35</sup> By the time the Gale of 1878 struck, neither of the steeples were in top condition to withstand damage from the storm. The storm, a Category 2 hurricane with maximum wind speeds of 100 miles per hour, raged for three days causing severe damage across the east coast. In Philadelphia, at least 700 buildings were destroyed while nearly fifty church buildings lost their spires.<sup>36</sup> Across the river in Camden, New Jersey, the spire of the Fourth Presbyterian Church toppled and crashed through the roof of the church.<sup>37</sup> McArthur's steeples survived, but were both seriously damaged and repaired at great cost. A

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<sup>34</sup> Frank N. Kneas, "Steeple of the First Presbyterian Church of Salem N.J." (condition assessment drawing).

<sup>35</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, Philadelphia, Pennsylvania, 1857-1894, Papers of the Tenth Presbyterian Church, Philadelphia, PA.

<sup>36</sup> David M. Roth and Hugh D. Cobb III, "Re-analysis of the Gale of '78 - Storm 9 of the 1878 Hurricane Season," Weather Prediction Center, National Atmospheric and Oceanic Administration, Last updated May 27, 2000, <https://www.wpc.ncep.noaa.gov/research/roth/galeof78.htm>.

<sup>37</sup> Ibid.

few months later, after the repairs to the Tenth Presbyterian steeple were complete, the curators reported that “the expense has been very large as examination showed great decay and more work than was expected,” evidencing that the performance of the steeples was beginning to be affected by deterioration.<sup>38</sup>

Another 34 years passed before the next catastrophic storm struck on February 22, 1912, carrying with it winds recorded up to 96 miles per hour.<sup>39</sup> This time McArthur’s steeples did not fare as well, presumably weakened by unnoticed deterioration that had been mounting over the years. The damage to both First Presbyterian and Tenth Presbyterian demanded the congregations’ attention, and ended in very different results. The Tenth Presbyterian congregation, due to the severity of the damage to the building and the risk of structural collapse, opted to demolish the steeple, which they accomplished before the end of the year.<sup>40</sup>

The congregation of First Presbyterian, however, took a different approach to the treatment of their steeple. Perhaps they were afforded greater latitude in their decision making because the steeple was much smaller and access for repairs was more readily accomplished. Initially they made the decision to also demolish their steeple, obtaining an estimate for the work from John F. “Jack” Hassler, the same steeple jack that had just demolished the steeple of Tenth Presbyterian a few months earlier.<sup>41</sup> For the entire month of May 1913, the Trustees and building committee met repeatedly, deliberating over prices and demolition strategies for the steeple. One strategy the Trustees entertained was that of removing the spire and leaving the

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<sup>38</sup> Minutes of the Board of Trustees, West Spruce Street Presbyterian Church, Philadelphia, PA.

<sup>39</sup> “Summary of Storm’s Work,” *Philadelphia Inquirer*, February 23, 1912.

<sup>40</sup> Application for Permit for Repairs, Minor Alterations, Frame Buildings, Bay Windows, Heaters, Boiler and Engine Foundations, etc., City of Philadelphia, Bureau of Building Inspection, Permit No. 9591, December 3, 1912.

<sup>41</sup> Minutes of the Board of Trustees, First Presbyterian Church of Salem, New Jersey, 1821-1920, Papers of the First Presbyterian Church of Salem, New Jersey.



belfry in place. It appears that the strategy would have involved taking down the steeple “as far as the base of the shingle part” and roofing over the belfry at the level of the skirting roof.<sup>42</sup> One congregant, who had recently visited Philadelphia and had witnessed Tenth Presbyterian’s new steeple-less look, testified to “the attractive appearance of the church after the steeple had been taken down.”<sup>43</sup> The Trustees went as far as to request to see the contract between Mr. Hassler and Tenth Presbyterian. As deliberations proceeded, one Elder of the congregation began to have different ideas about the best outcome for the steeple. Charles Ayars, who was president of the Ayars Machine Company, and is remembered as an inventor and preservationist, couldn’t resist the urge to climb up into the steeple and have a look for himself.<sup>44</sup> He brought along with him an engineer from Philadelphia, Frank N. Kneas, to conduct an assessment. The two reported to the Trustees that the steeple could be repaired in lieu of demolition, making it “as strong and safe for the next fifty years as it had been for the last fifty years.”<sup>45</sup> The Trustees reversed their initial decision and authorized having the steeple “put in as safe condition as they possibly could,” at a price of \$500, 14% higher than the proposal for demolition. The structural repairs, delineated in a large drawing by Mr. Kneas, were completed by early 1914.<sup>46</sup>

The repairs staved off the deterioration temporarily, but over the course of the next 80 years, the condition of the steeple again worsened. By 1984, again precipitated by a storm event, the steeple underwent repair by means of internal steel shoring totaling approximately

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<sup>42</sup> Ibid.

<sup>43</sup> Ibid.

<sup>44</sup> First Presbyterian Church of Salem, “1913 Steeple Drawing” (narrative, First Presbyterian Church of Salem, undated).

<sup>45</sup> Minutes of the Board of Trustees, First Presbyterian Church of Salem, New Jersey.

<sup>46</sup> Frank N. Kneas, “Steeple of the First Presbyterian Church of Salem N.J.” (condition assessment drawing).

20 tons.<sup>47</sup> The steel shoring, while not quite efficient in its design or installation, did the job of circumventing the original load paths of McArthur's original design and buying time for the steeple. In 1996, the Board of Trustees of First Presbyterian contracted with Watson & Henry Associates, a preservation architecture/engineering firm, to conduct a condition assessment of the steeple. The assessment culminated in the recommendation that the steeple undergo a "Functional Restoration," which was designed and executed to fully restore McArthur's original structural configuration.<sup>48</sup> Modifications to the original design were limited to a change in wood species, and the addition of a modern tie-down system. Deteriorated wood members of old growth eastern white pine were replaced in-kind with Select Structural southern yellow pine; the change was made to compensate for reduced quality of modern white pine. The tie-down system, designed by Carl Baumert of Keast & Hood Structural Engineers of Philadelphia, comprised two tiers of tie-down rods through the belfry level and from the lower box frame to shoring beams deeper in the masonry tower, and diagonal cable bracing through belfry level.<sup>49</sup> The functional restoration of the First Presbyterian steeple involved large-scale disassembly of sections of the steeple, brought to ground level for easier access.<sup>50</sup> Fortunately, for this "heroic repair," one of McArthur's two steeples remains in place, as the physical record of his internal armature structural design.

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<sup>47</sup> Watson & Henry Associates, 3.

<sup>48</sup> *Ibid*, 1.

<sup>49</sup> Carl Baumert, "Proposed Details to Reinforce Steeple to Resist Wind Load," (structural calculations and design notes, June 24, 1996 – December 6, 1997).

<sup>50</sup> Jan Lewandoski, "Historic American Timber-Framed Steeples: II. Restoration Strategies," *Timber Framing* 85 (September 2007), 6.

## Conclusion

In order to understand this period of John McArthur, Jr.'s career, this thesis examined the ideological principles, architectural professionalism and influences, and structural experimentation and performance of two remarkably tall wood-framed steeples designed by McArthur. Understanding these steeple designs perhaps sheds light on what compelled him, later in his career, to repeatedly set out to design structures that would be the highest in their cities or country. John McArthur, Jr.'s designs for the steeples of the Tenth and First Presbyterian churches, while they were stylistically representative of many churches of the Round-Arched style built during that period, they were remarkably high. Their unusual height, particularly Tenth Presbyterian rearing up to 248 feet, is the result of a confluence of factors. They represent the result of competition among ambitious church congregations, competition among architects in an emerging profession, and McArthur's own structural confidence. Through this comparative analysis, a picture of McArthur at this early period of his career emerges. McArthur, designing very tall wood-framed structures by applying his knowledge of materials gained from a decade working in the carpentry trade. Combined with his knowledge of wood and carpentry, McArthur also applied intuition, creating structures that were experimental in multiple ways. His experimentation had consequences, both good and bad, for the performance and outcomes for both steeples.

This research has allowed me to see that there are new questions to be answered. Where did McArthur get the idea to create an internal armature steeple frame? Was it an idea he gleaned from a book or a colleague, or was it the product of his own structural experimentation? And how common or widespread was the use of this type of frame? This study hardly exhausts the investigation of McArthur's use of an internal armature steeple frame

and its possible use elsewhere in America or abroad. This thesis serves, rather, to illustrate a broader field of study opened up by a clearer comprehension of McArthur's wood-framed steeples in the context of mid-nineteenth century steeple design and construction.



**Fig. 1.** John McArthur, Jr., c. 1860s. (Courtesy of the Fort Delaware Society.)

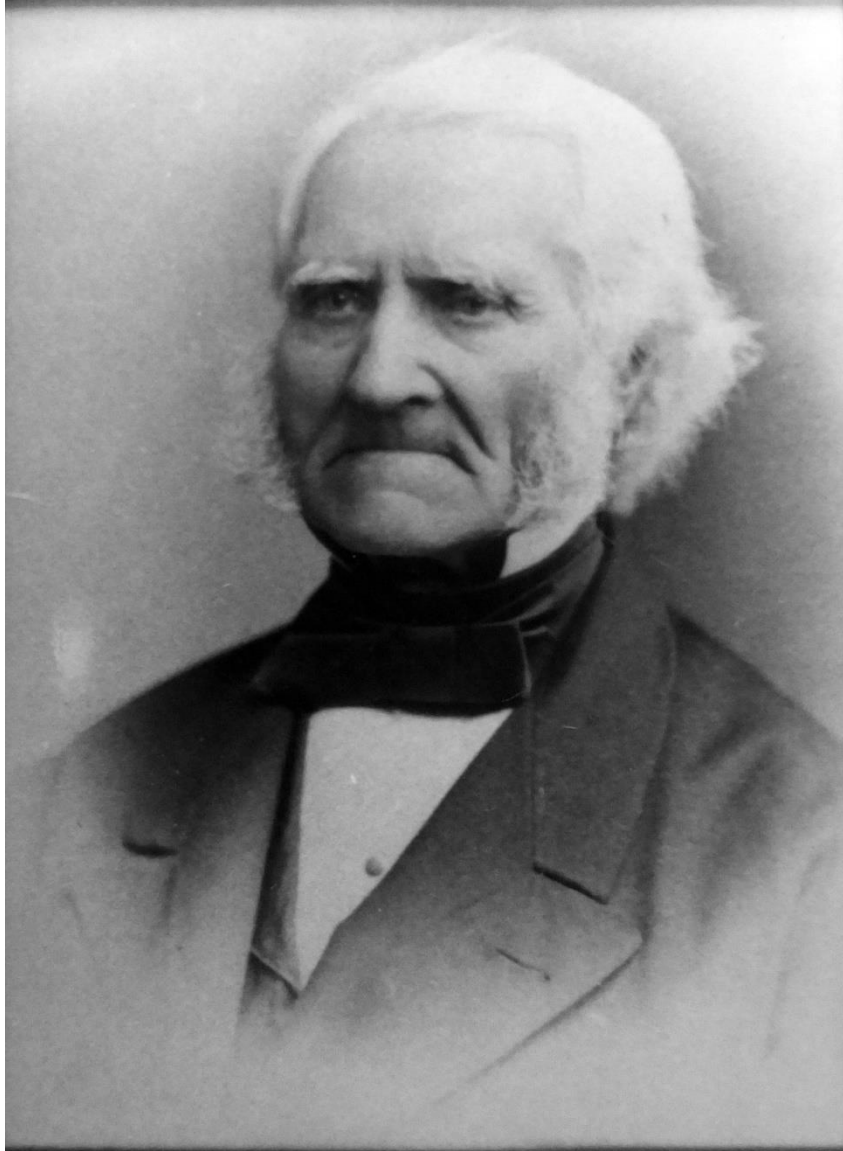


**Fig. 2.** John McArthur, Jr.'s steepled churches.

Left: West Spruce Street Presbyterian Church (Tenth Presbyterian, 1855-57), Philadelphia, PA,  
1898 photograph;

Right: First Presbyterian Church (1856), Salem, NJ, postcard c. 1906

(Both images courtesy of the Presbyterian Historical Society.)



**Fig. 3.** John McArthur (senior), c. 1880s. (Courtesy of the Carpenters' Company of the City and County of Philadelphia.)

*A New Truss Girder.*

The accompanying drawings exhibit the construction of a new trussed girder, the invention of Mr. John McArthur, Jr., a young and ingenious architect of our city.

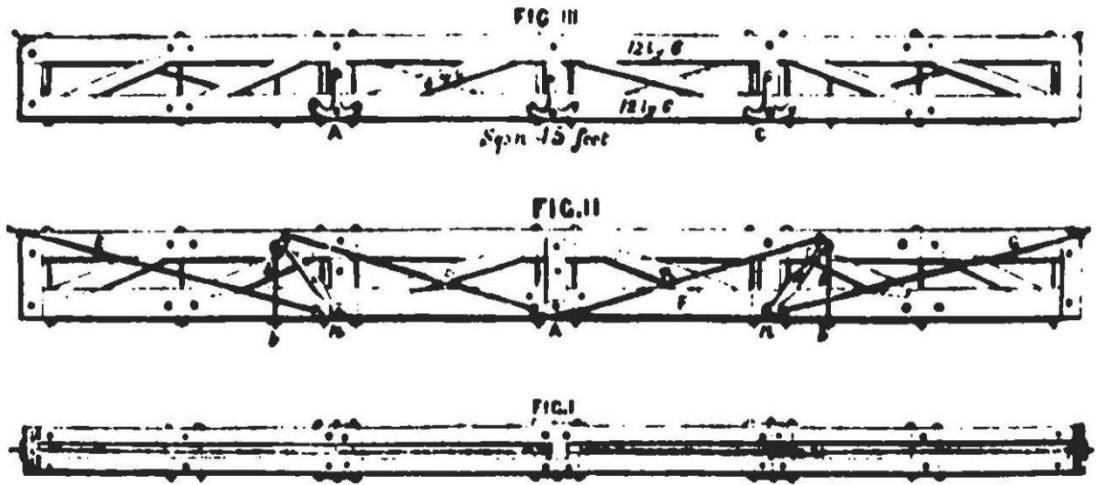
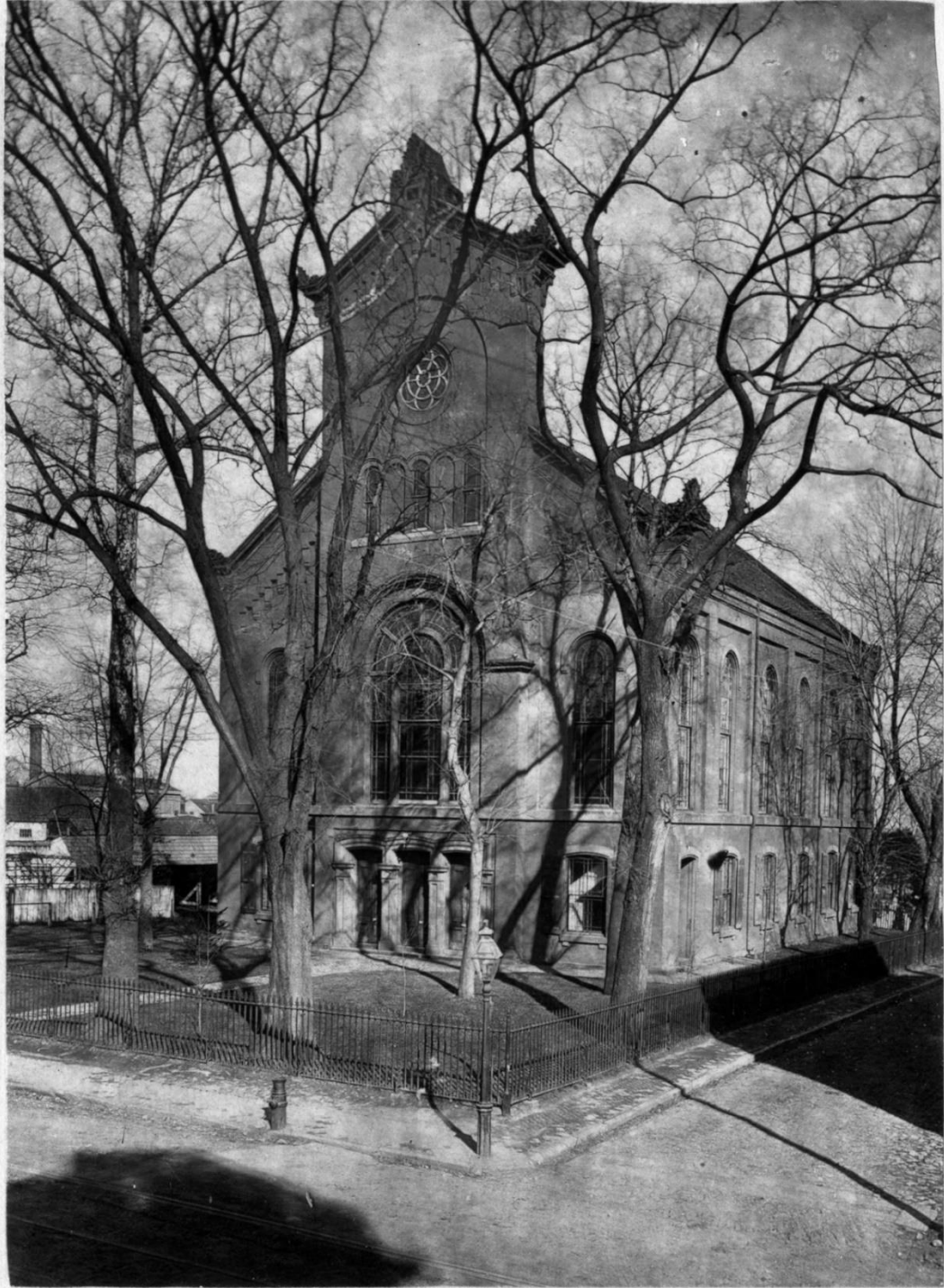


Fig. 4. John McArthur, Jr.'s design for "A New Truss Girder," 1849. From the *Journal of the Franklin Institute*.





**Fig. 5.** Mikveh Israel Synagogue (1860) at 7<sup>th</sup> and Arch Streets, Philadelphia, PA. 1901 photograph. (Public domain.)



**Fig. 6.** "Presbyterian Church of Frankford, As It Is, 1872," by John Carbutt. From Rev. Thomas Murphy, *One Hundred Years of the Presbyterian Church of Frankford*, (Philadelphia, PA: American Photo-Relief Printing Company, 1872).

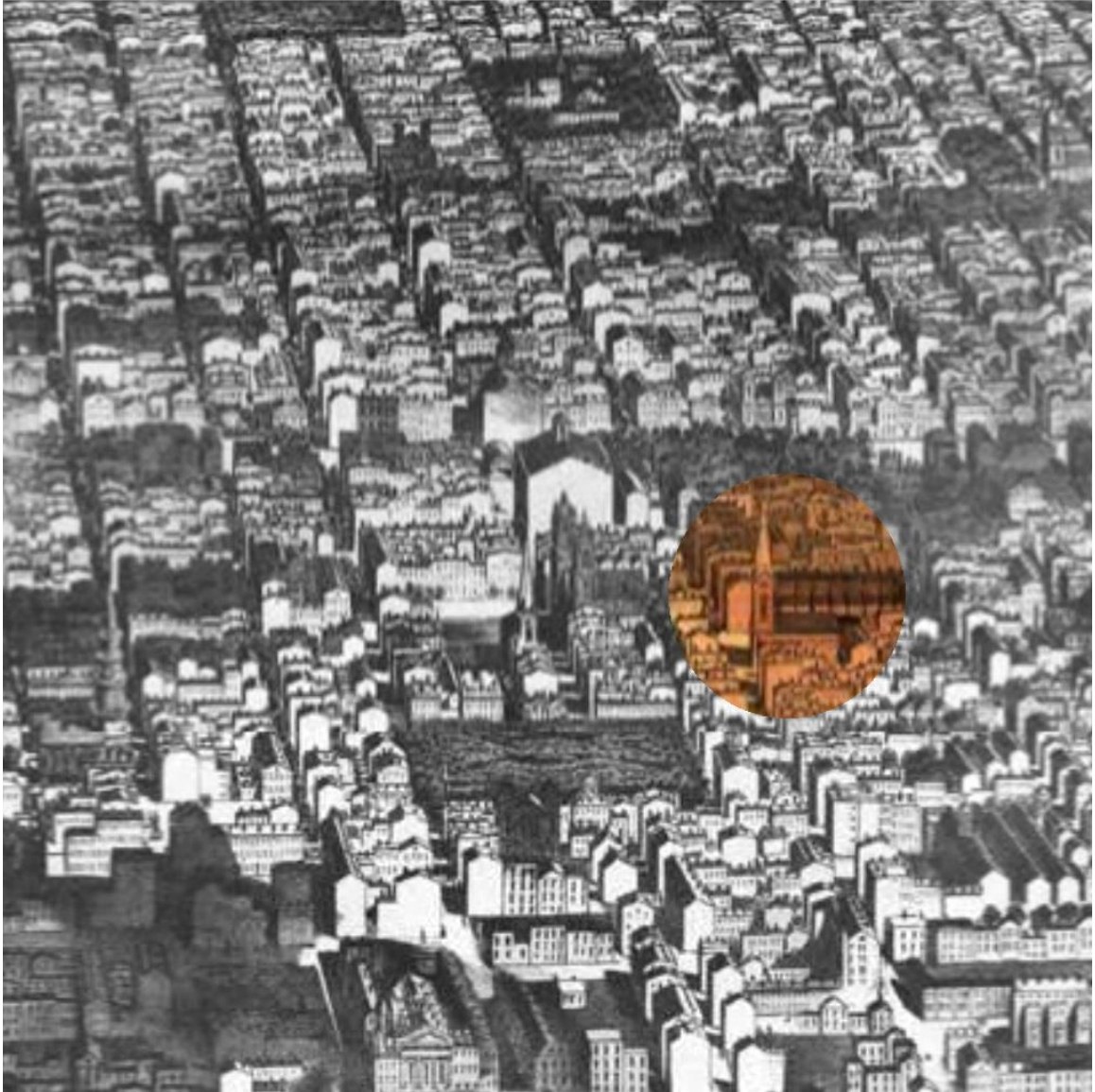


**Fig. 7.** Portion of “An East Perspective View of the City of Philadelphia, in the Province of Pennsylvania [sic.], in North America: taken from the Jersey Shore, after Carrington Bowles, (London: Carrington Bowles, 1774). (Courtesy John Carter Brown Library, Brown University.)

Steeple numbered:

1. Christ Church
2. The State House (Independence Hall)
3. Whitefield Meeting House
4. Second Presbyterian Church, 3<sup>rd</sup> and Arch Streets
5. German Reformed Church
6. Town Hall
7. Great Meeting House

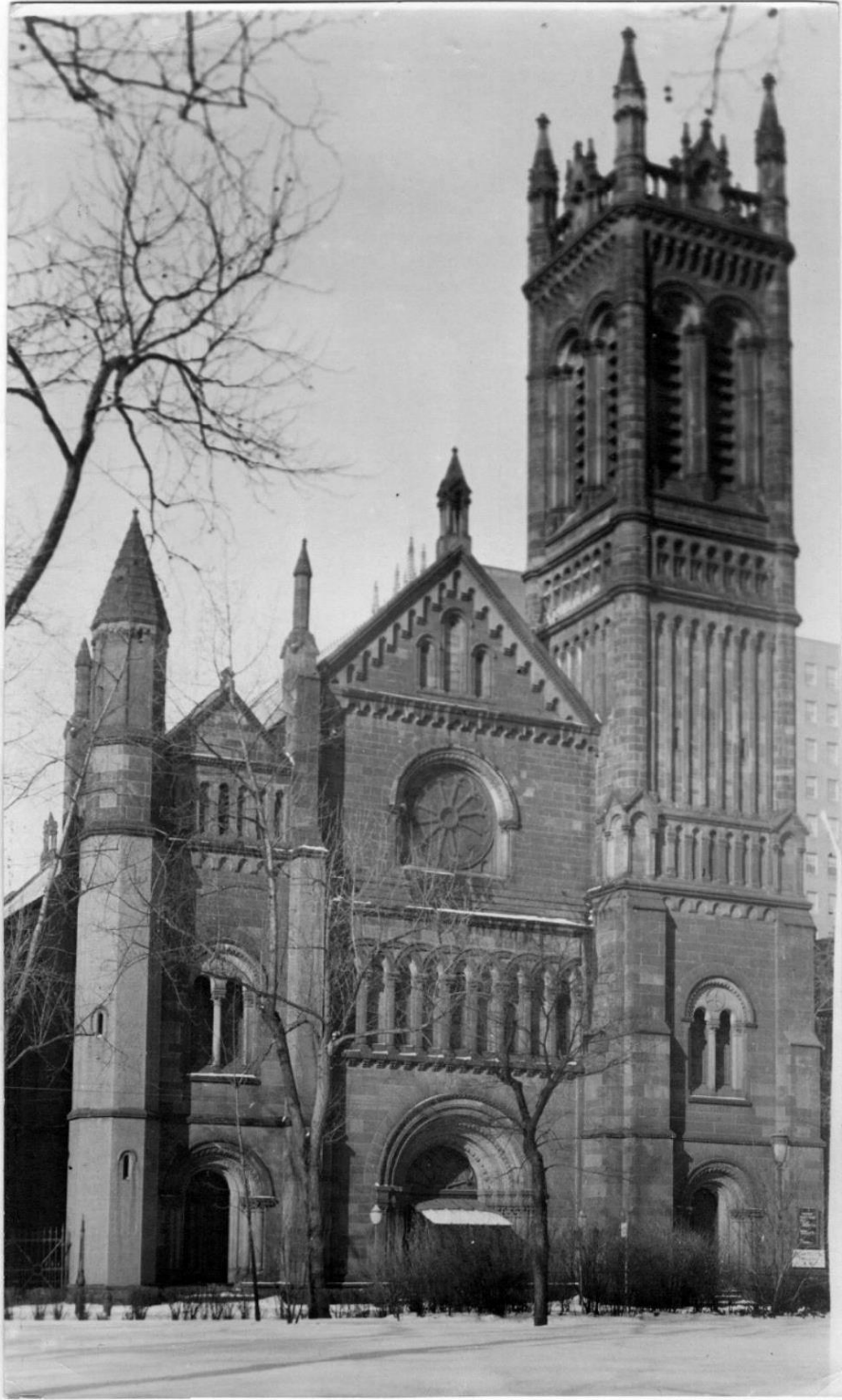




**Fig. 8.** West Spruce Street Presbyterian Church (Tenth Presbyterian) at 17<sup>th</sup> and Spruce Streets. Detail from “Bird’s Eye View of Philadelphia” by J. Bachmann del. & lith. (Philadelphia: P.S. Duval & Son, 1857). (Courtesy of the Library Company of Philadelphia.)



**Fig. 9.** "Philadelphia, PA. West Spruce St. Presbyterian Church," 1898 photograph. (Courtesy of the Presbyterian Historical Society.)



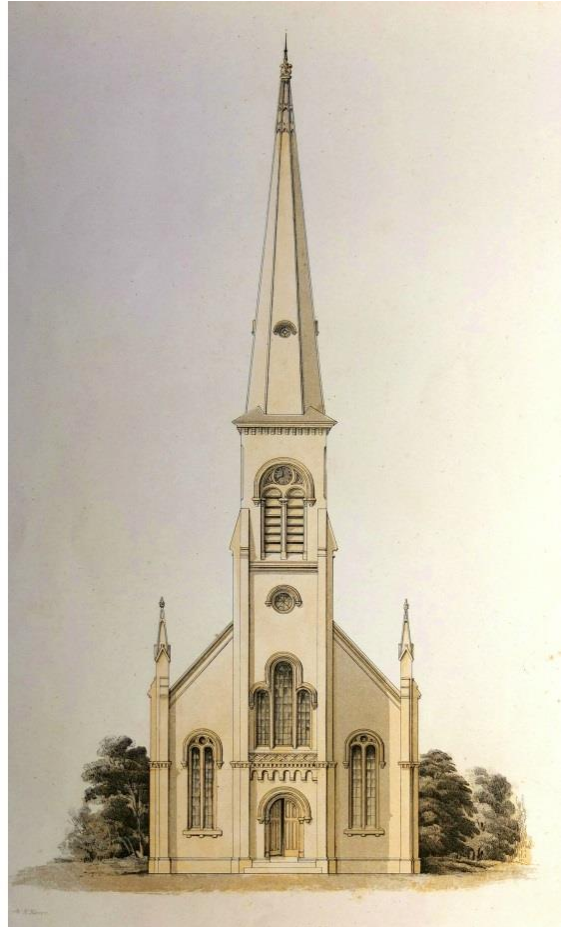
**Fig. 10.** Trinity Church, Rittenhouse Square (1856-59) by John Notman. (Lutz, K. F., Photographer). (Courtesy of the Athenaeum of Philadelphia.)



**Fig. 11.** Left: West Spruce Street Presbyterian Church (Tenth Presbyterian, designed 1852-54), 1898 photograph. (Courtesy of the Presbyterian Historical Society);

Right: Design XIII, by Austin and Brown Arch<sup>t</sup>, N. Haven. From Central Committee, *A Book of Plans for Churches and Parsonages*, (New York, NY: Daniel Burgess & Company, 1853.)





**Fig. 12.** Left: First Presbyterian Church of Salem (Designed 1853-54). *Historic American Buildings Survey*, 1933 photograph by A Vankirk.

Right: Design V, by Sidney M. Stone Arch, N. Haven. From Central Committee, *A Book of Plans for Churches and Parsonages*, (New York, NY: Daniel Burgess & Company, 1853.)

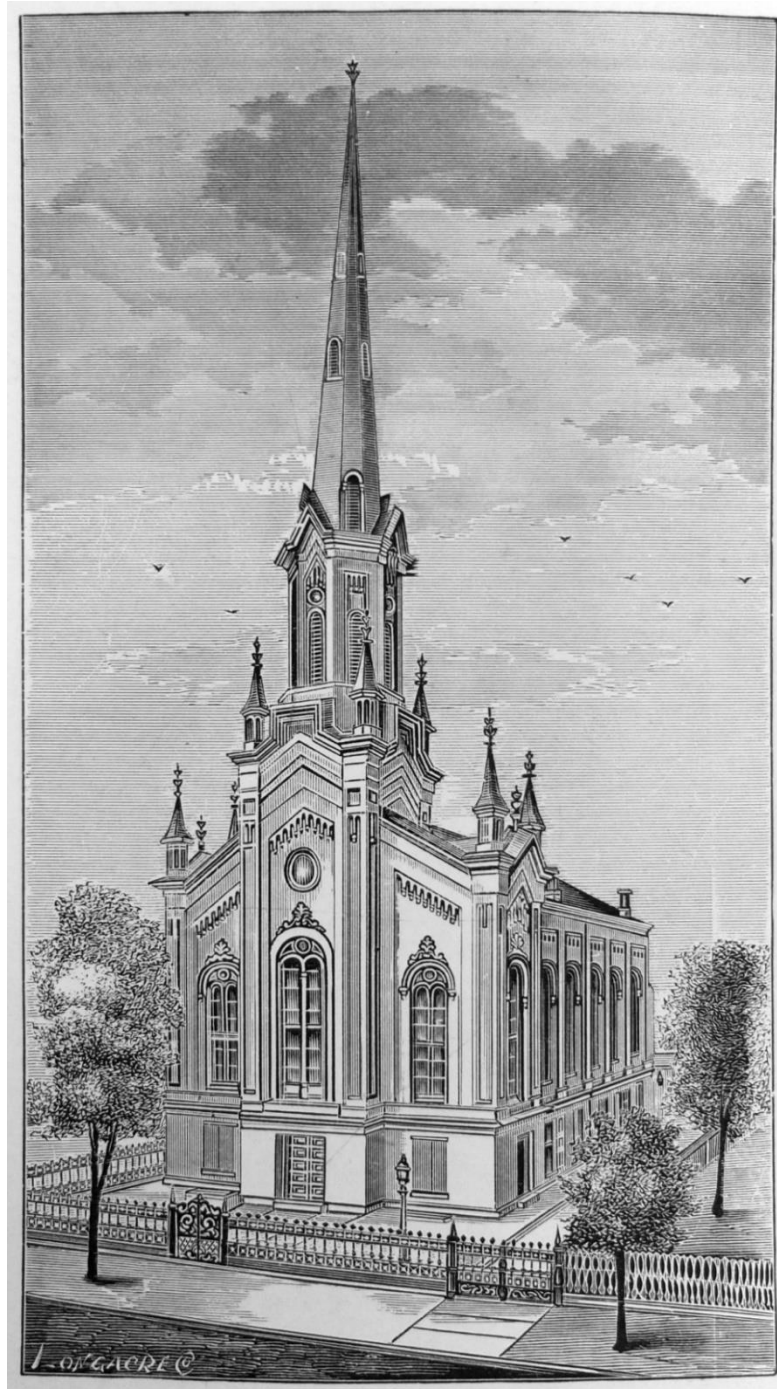




**Fig. 13.** Illustration of West Spruce Street Presbyterian Church (Tenth Presbyterian) from pew rent certificate, c. December 1853. The Trustees of the West Spruce Street Presbyterian Church Philadelphia. (Courtesy of the Historical Society of Pennsylvania.)



**Fig. 14.** Wylie Memorial Church (1854). From Rev. Thomas A. Hoyt, *Dedication Souvenir of the Chambers-Wylie Memorial Presbyterian Church; With a History of the Original Churches and Description of the New Building*. (Philadelphia: the Building Committee [of the Chambers-Wylie Memorial Presbyterian Church], 1901).



**Fig. 15.** First Presbyterian Church, Salem, NJ (1856). From Quinton Gibbon, M.D., *History of the "First Presbyterian Church" of Salem, N.J.* (Salem, NJ: Session of the First Presbyterian Church of Salem, N.J., 1889). (Courtesy of the Presbyterian Historical Society.)



**Fig. 16.** "Philadelphia, PA. West Spruce St. Presbyterian Church," from William P. White and William H. Scott, *Presbyterian Church in Philadelphia, A Camera and Pen Sketch of Each Presbyterian Church and Institution in the City.* (Philadelphia: Allen Lane & Scott, 1895).

(Courtesy of the Presbyterian Historical Society.)



**Fig. 17.** *Carte de Visite*, photographer John P. Flynn, First Presbyterian Church of Salem, NJ John (before 1883) (Courtesy of Janet Sheridan.)





**Fig. 18.** Tenth Presbyterian Church (1855-57). Above: c. 1967 photograph by John R. Wells; Below: "...the Italianate West Spruce Street Presbyterian Church," 2005 photograph by Tom Crane. From Roger W. Moss and Tom Crane, *Historic Sacred Places of Philadelphia*. (Philadelphia: University of Pennsylvania Press, 2005).



**Fig. 19.** Basilica of Sant'Ambrogio, Milan, Italy (1099). (Courtesy of MemoMi: La Memoria di Milano, 2014.)





**Fig. 20.** First Presbyterian Church of Salem, NJ (1856). (Courtesy of Christine DeGraff, Websketching, LLC.)





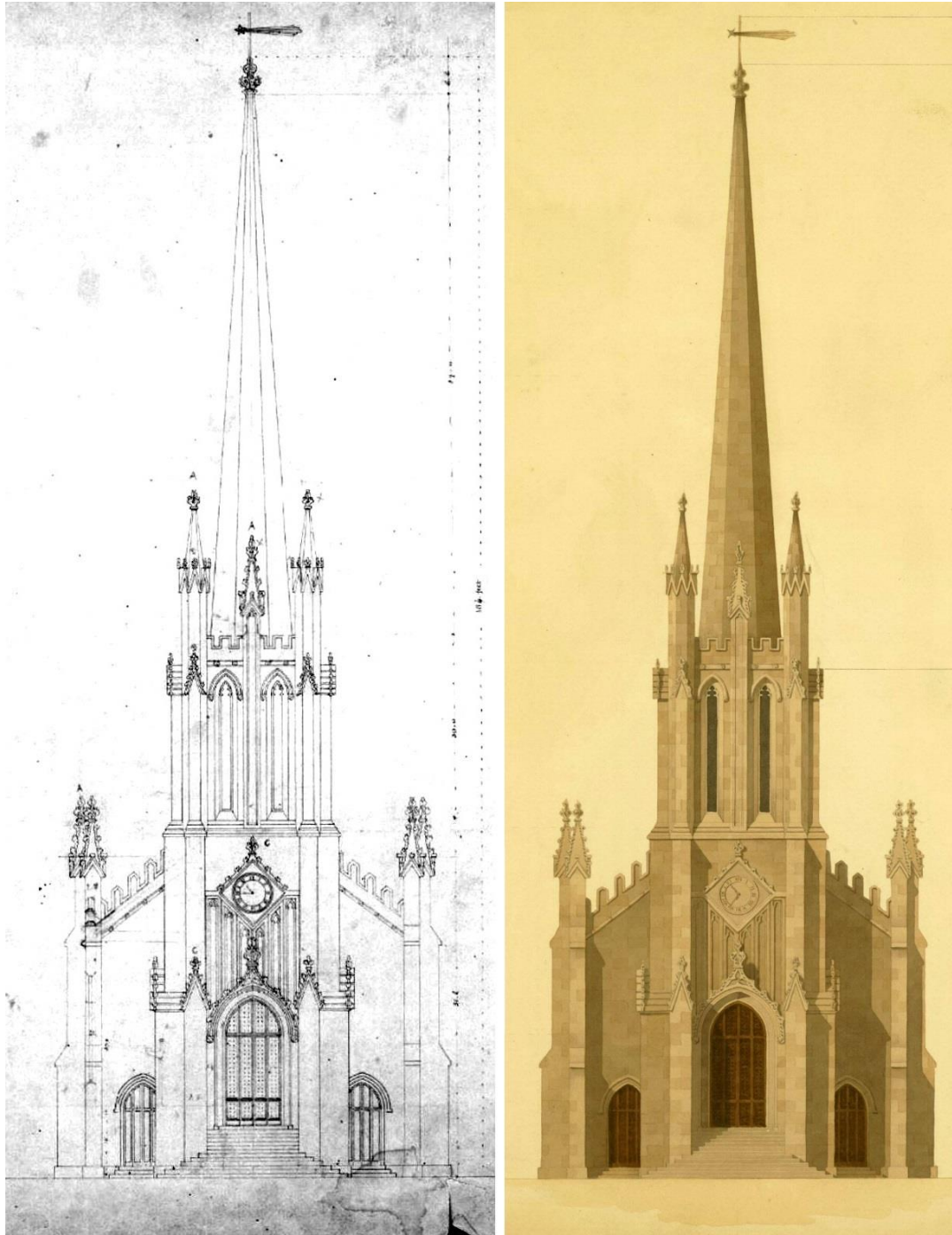
**Fig. 21.** *Michaelskirche*, Berlin, Germany by August Soller (published 1845).  
(Courtesy of <https://seeinberlin.com>.)





**Fig. 22.** Left: Ludwigskirche, Munich, Germany, by Friedrich von Gärtner (1829-44).  
(Public domain.)

Right: Tower of West Spruce Street Presbyterian Church (Tenth Presbyterian,  
1855-57) (Courtesy of the Presbyterian Historical Society.)



**Fig. 23.** Gothic chapels by T.U. Walter

Left: Freeman Street Baptist Church (1850);

Right: Design for a Church at Shanghai, China (1850);

(Both images courtesy of the Athenaeum of Philadelphia.)



**Fig. 24.** "A Village Church," From Samuel Sloan, *The Model Architect [truncated]*, (Philadelphia: E.S. Jones & Co., 1852).

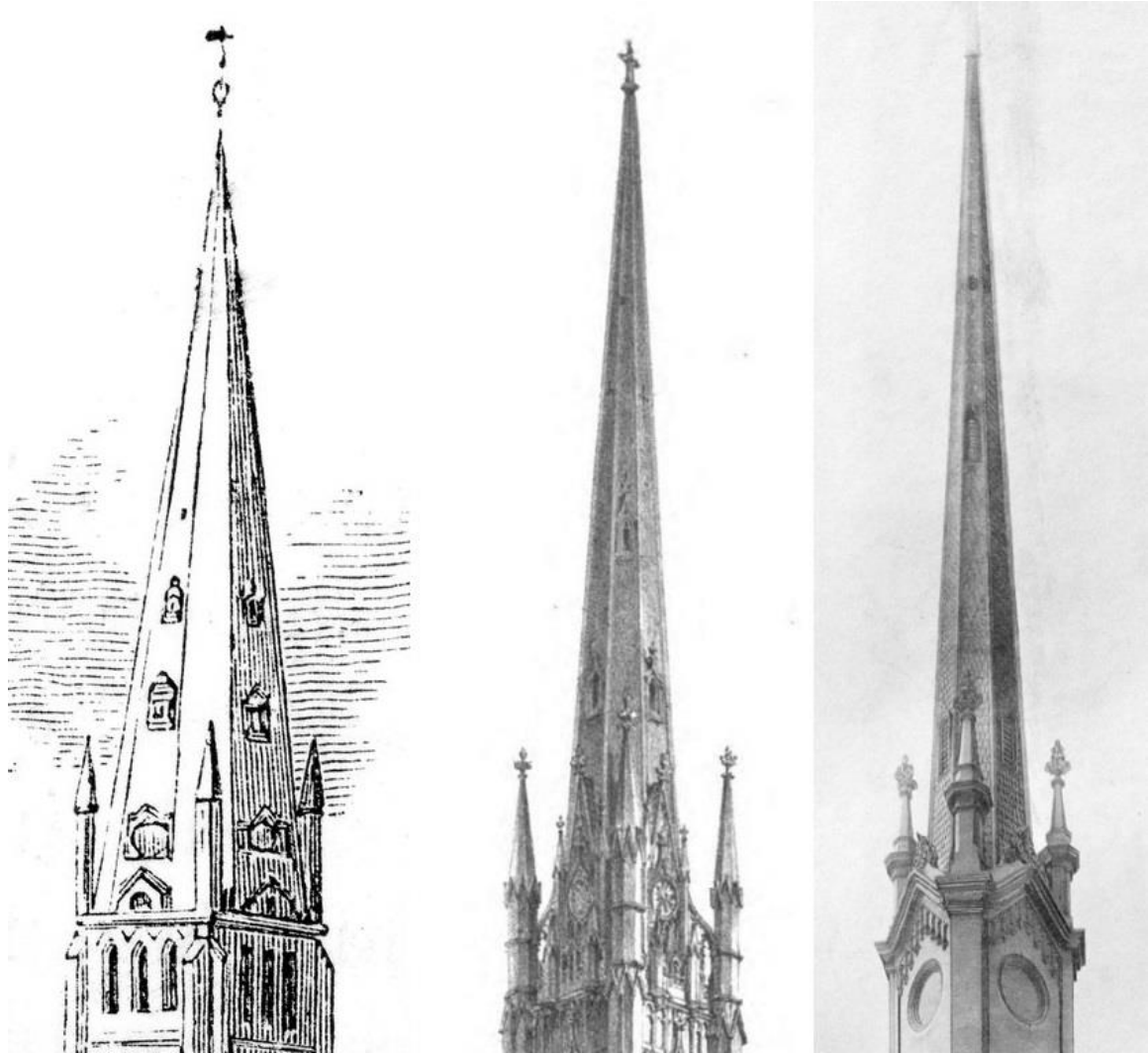




**Fig. 25.** John McArthur, Jr.'s steepled churches.

Left: West Spruce Street Presbyterian Church (Tenth Presbyterian, 1855-57). (Courtesy of the Presbyterian Historical Society.)

Right: First Presbyterian Church, Salem, NJ (1856). (Courtesy of Janet Sheridan.)



**Fig. 26.** Comparison of Gothic, Gothic revival, and Gothic-inspired steeples.

Left: Old Saint Paul's Cathedral, London (1314). Duncan 1890 from a print by Hollar.

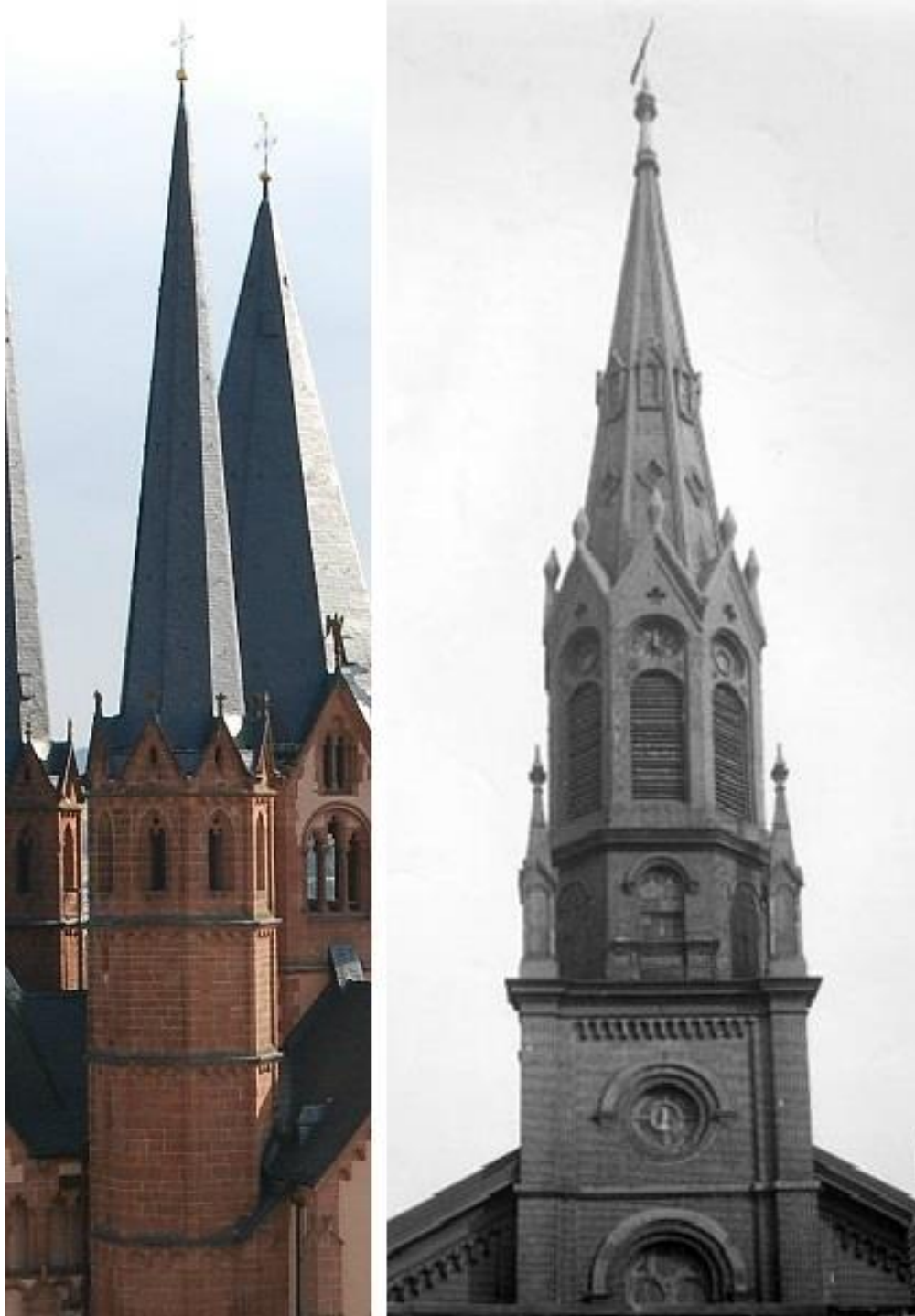
Center: Church of the Holy Trinity (1844-47), Brooklyn, NY by Minard LaFever.

Right: West Spruce Street Presbyterian Church (Tenth Pres., 1855-57) by John McArthur, Jr.



**Fig. 27.** Emmanuel Evangelical Lutheran Church (1868) at 4<sup>th</sup> and Carpenter Streets, Philadelphia, by Collins & Autenrieth Architects. 1959 photographs (stitched by author).

(Courtesy of City of Philadelphia, Department of Records.)



**Fig. 28.** Comparison of spires.

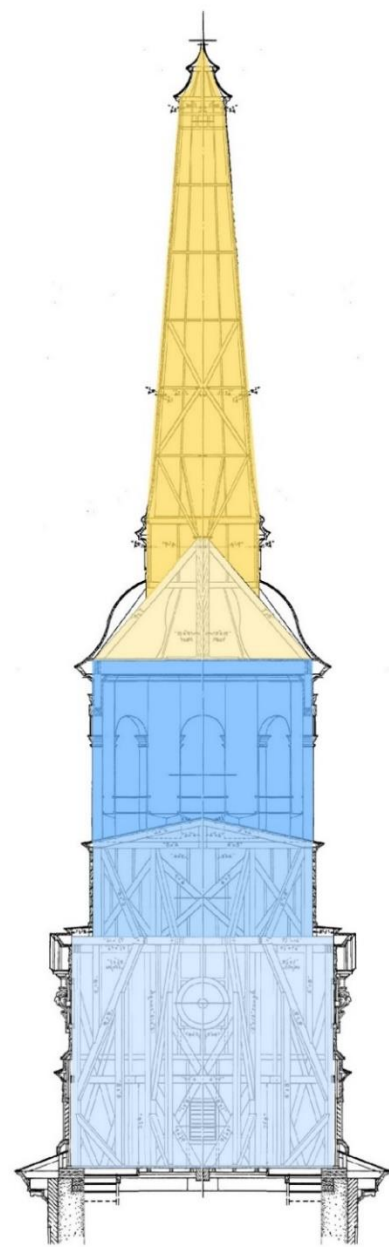
Left: Marienkirche, Gelnhausen, Germany (1195). (Public domain.);

Right: Emmanuel Evangelical Lutheran Church (1868).

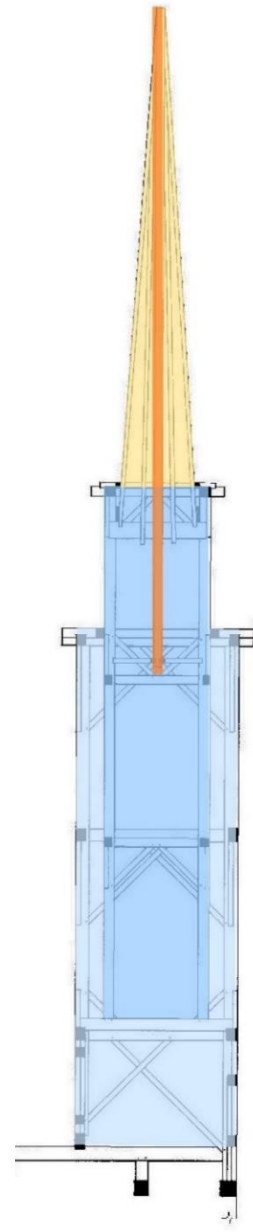




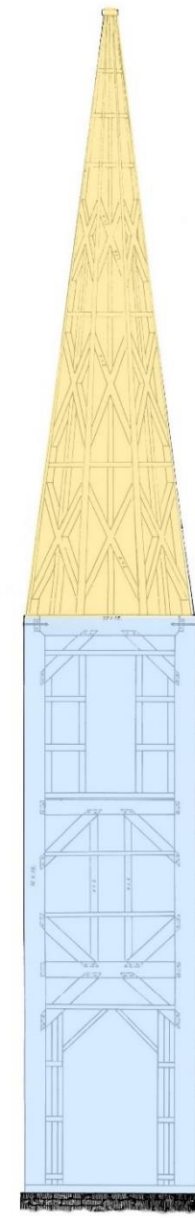
**Fig. 29.** Resetting of belfry frame, First Presbyterian Church, Salem, NJ (1997). Note scale of timber frame in relation to people on top of scaffolding. (Courtesy of Janet Sheridan.)



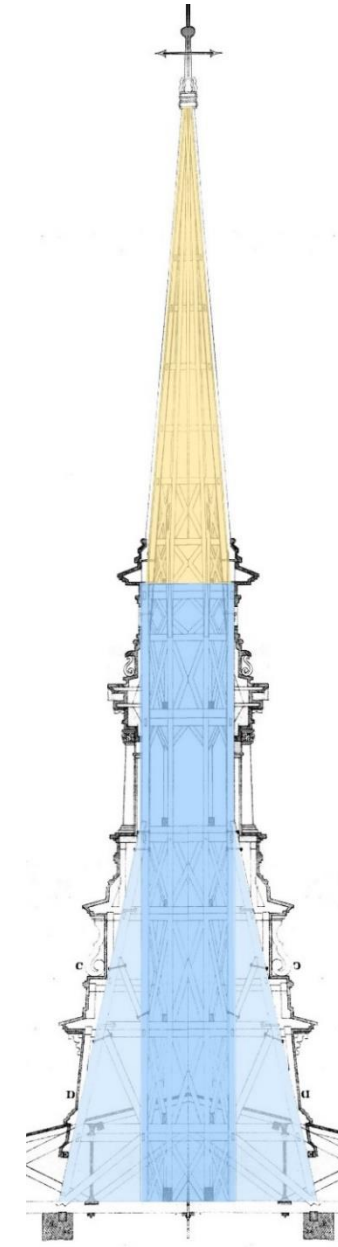
**A. Stacked Box Frame**  
Christ Church, Philadelphia  
Robert Smith, 1751-54



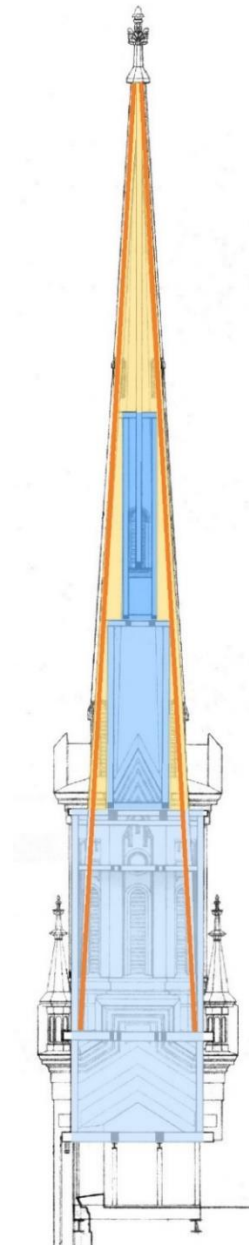
**B. Central Mast Spire**  
Castleton Federated Church, VT  
Thomas Dake, 1832



**C. Stacked Box Frame**  
"Wooden Church" in *Rural Architecture*  
Richard Upjohn, pub. 1852






**D. Stacked Box Frame with External Structure**  
First Pres. Church, Kensington, Philadelphia  
Samuel Sloan, constr. 1858, pub. 1865

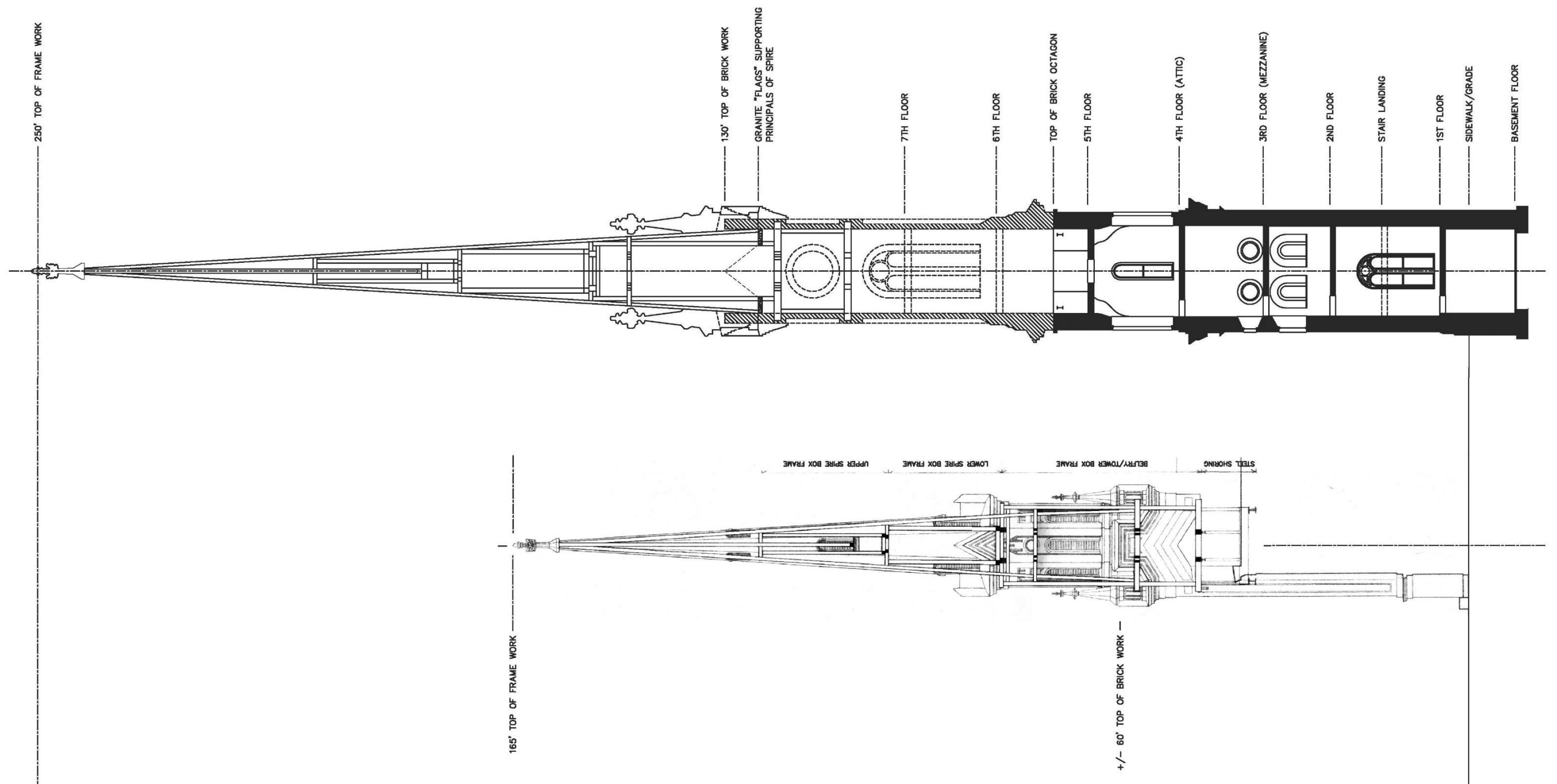


**E. Internal Armature Box Frame**  
First Pres. Church, Salem, NJ  
John McArthur Jr., 1854-56

**Fig. 30.** Comparison of timber-framed steeple framing methods.

**LEGEND**

-  Specialized framing members
-  Spire cones
-  Box frames

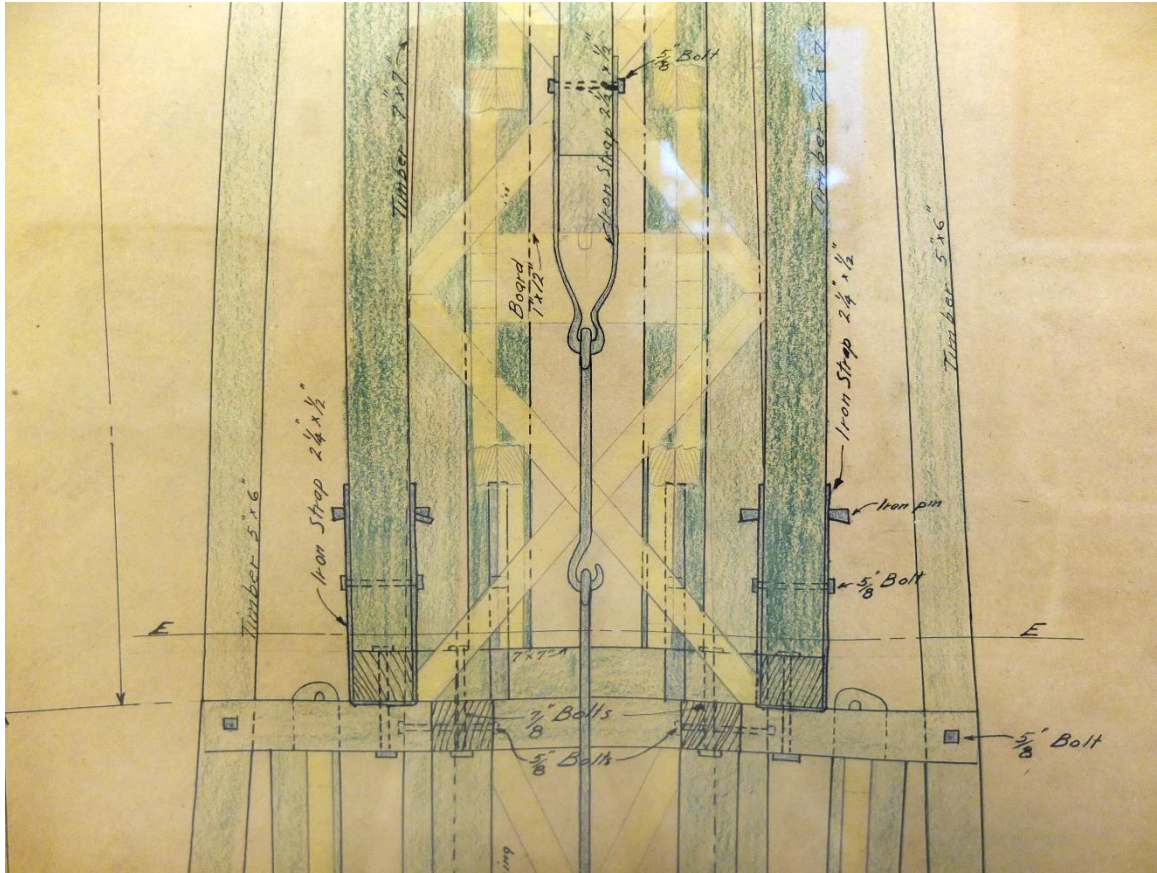


**Fig. 31.** Tower/Steeple Sections of John McArthur, Jr.'s Steepled Churches, drawings by author.

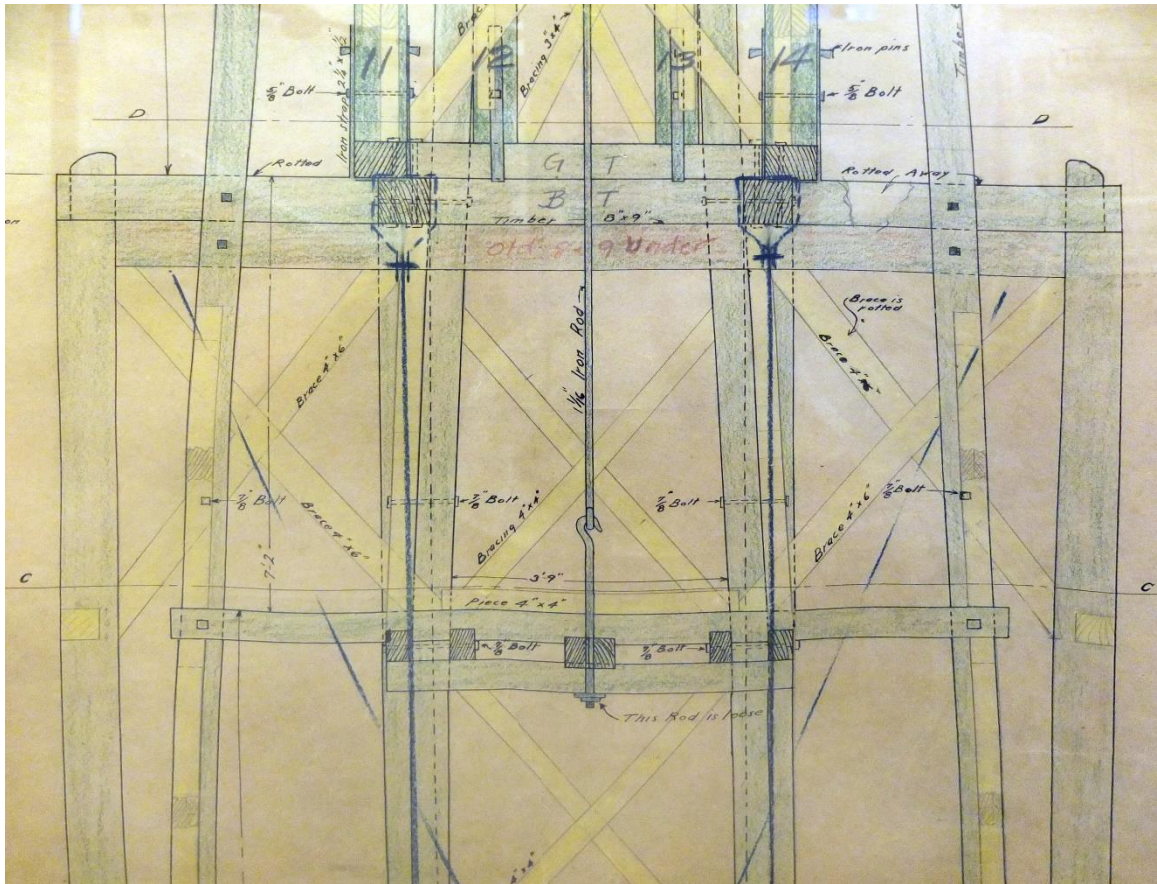
Left: First Presbyterian Church, Salem, NJ (1856)

Right: Tenth Presbyterian Church, Philadelphia, PA (1855-57). Conjectural drawing based on framing system extant at First Presbyterian Church.





**Fig. 32.** First Presbyterian steeple, bottom of the central spire post connected by an original tensioning system of rods and straps. Portion of condition assessment drawing by Frank N. Kneas (1913).



**Fig. 33.** First Presbyterian steeple, bottom of tensioning system showing problem of slackening over time where it is plainly noted “this rod is loose.” Portion of condition assessment drawing by Frank N. Kneas (1913).

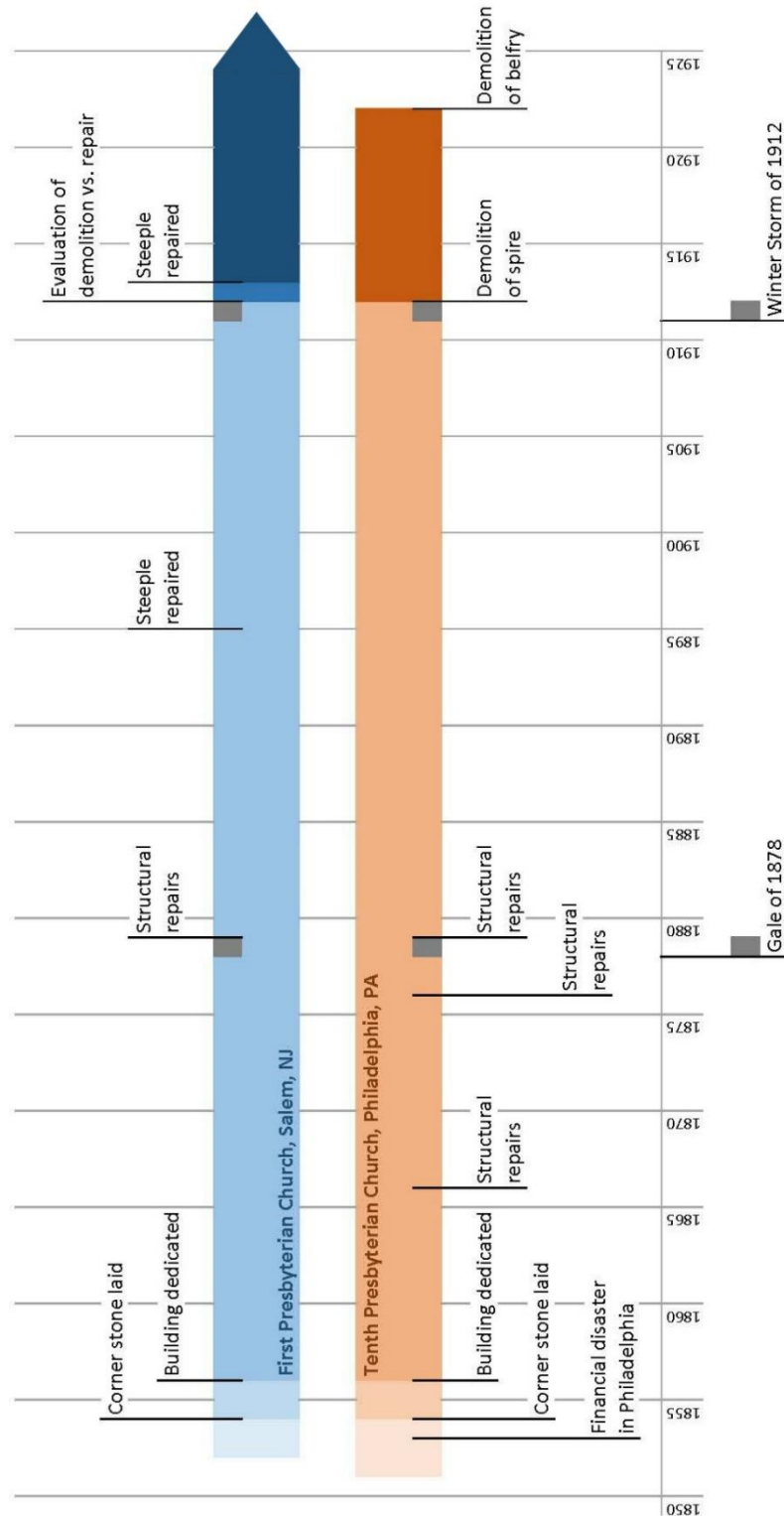


Fig. 34. Timeline of John McArthur, Jr.'s Steepled Churches, by author.

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Application for Permit for Additions, Alterations, Repairs, One-Story Structures, Frame Buildings, Bay Windows, Heaters, Boiler and Engine Foundations, etc. City of Philadelphia, Bureau of Building Inspection, Permit No. 723. February 4, 1922.

"before tower was removed" (clipping), Benson Scrapbooks. Athenaeum of Philadelphia, Philadelphia, PA, Local Call: 131-SB-84.

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## **Appendix A**

John McArthur, Jr., *Contract and Specifications for the Erection of a New Church Building and Its Appurtenances, for the West Spruce Street Presbyterian Congregation*  
(Philadelphia, PA: J. Craig, 1855).

CONTRACT  
AND  
SPECIFICATIONS  
FOR  
THE ERECTION OF  
A  
NEW CHURCH BUILDING  
AND  
ITS APPURTENANCES,  
FOR THE  
**WEST SPRUCE STREET**  
*Presbyterian Congregation.*

PHILADELPHIA:  
PRINTED BY J. CRAIG,  
116 CHESTNUT STREET.  
1855.

CONTRACT  
AND  
SPECIFICATIONS  
FOR  
THE ERECTION OF  
A  
NEW CHURCH BUILDING  
AND  
ITS APPURTENANCES,  
FOR THE  
WEST SPRUCE STREET  
Presbyterian Congregation.

## CONTRACT AND SPECIFICATIONS

*For the Erection of a New Church Building and its Appurtenances for the West Spruce St. Presbyterian Congregation.*

### AN AGREEMENT

entered into this \_\_\_\_\_ day of \_\_\_\_\_  
A. D. one thousand eight hundred and fifty-five,  
between the West Spruce Street Presbyterian Church, of the one  
part, and \_\_\_\_\_ Builder, of the  
other part.

FIRST.—The said \_\_\_\_\_ agrees to  
build, erect and complete a New Church Edifice and Lecture Room,  
with their appurtenances, upon a lot of ground fronting upon  
Spruce and Seventeenth Streets, in the City of Philadelphia, eighty-  
two feet, nine inches front on Spruce Street, and one hundred and  
seventy-three feet, nine inches deep, more or less.

SECOND.—That the said premises shall be built, erected and com-  
pleted, under the care, direction and superintendence of John  
McArthur, Jr., in accordance with the plans and specifications  
hereinafter particularly referred to.

THIRD.—That any difference between the Building Committee  
to be appointed by “the Trustees of the West Spruce Street Pres-  
byterian Church and \_\_\_\_\_, upon any  
matter or thing, arising from this contract, shall be decided by the  
said John McArthur, Jr., whose arbitrament, award and decision  
shall be considered final, conclusive and binding upon said parties.

FOURTH.—The said John McArthur, Jr., shall, at his discretion,  
refuse any material that may, in his opinion, be unfit for the pur-

poses of said work, and not in accordance with those mentioned in this contract, and he shall have full power to remove or cause to be removed, any unsound work; the same to be removed or altered at the expense of the said

FIFTH.—That during the progress of said work, and before the payments respectively agreed to be made by the said “the West Spruce Street Presbyterian Church,” as hereinafter mentioned, are demanded by the said \_\_\_\_\_, he shall furnish certificates at such times, respectively signed by the said John McArthur, Jr., certifying that said work has progressed and been completed to such points, in accordance with the provisions of this contract.

SIXTH.—The said building is to be completed in a good substantial and workmanlike manner, and of the best materials, and in accordance with the following specifications and plans referred to, viz. :

#### EXCAVATIONS.

The said \_\_\_\_\_ shall excavate cellars, wells, trenches for foundation walls, vaults and drains, as demonstrated upon the plans, bearing date the \_\_\_\_\_ day of \_\_\_\_\_ A. D., eighteen hundred and fifty-five, and signed by the parties respectively, and remove all superfluous matter (not required for grading,) which may accumulate on the premises, or be excavated, and also to make level and hard the beds of all trenches for footings, and consolidate the earth about the same. The cellar and coal vaults shall be excavated to a clear depth, not less than eight feet clear of first story joists. The depth of the footings for foundations in the cellars shall be not less than one foot below the lowest level, except those for the principal tower, which shall be not less than ten feet below the curb, (should a further depth be required, it shall be paid for exclusive of this contract, by the Church.) The portico piers shall be not less than five feet below the surface when completed; foundations for steps to be not less than two feet six inches below the surface.

Two wells for the privies, each seven feet, and one for the Pastor's water closet, six feet in diameter, must be sunk to water, at the Southern end of the lot, steined round with good hard brick, and domed over on the top.

The yards must be graded to discharge the water on Spruce and Seventeenth Streets.

#### STONE WALLS AND FOUNDATIONS.

All footings, foundations and stone walls must be laid in the most careful manner, with large stones, well bedded on their broadest face, in strong mortar, made of good lime and clean sharp gravel. The width of the footings to be not less than eight inches more than the walls upon them. The thickness of all walls and piers must correspond with the sizes marked on the plans and sections, and shall terminate at the bottom of first story joists. Foundations will be required for the granite base which sustains the iron railing enlosing the lot. The cellar, vaults and other exposed interior surfaces, must be dashed up and whitewashed. The trenches for all foundations must be filled to a depth of not less than four inches with concrete.

#### CUT STONE.

All outside steps, platforms, moulded and plain plinths and plinth courses around the towers, portico and flank on Seventeenth Street, also, all outside door and window sills, together with the columns in principal tower on Spruce Street, and such other portions of the work, so designated on the plans, must be of the best Connecticut Sandstone sharply cut and smoothly rubbed according to the drawings. A base course of North River flag shall extend from the South-east corner of the Lecture Room to the South-west corner of the small tower. This base must be five inches thick, and in height from a point six inches below the pavement line to the top of the first floor; it must be smooth at the joints, worked with a three inch wash on the top, and securely cramped with irons in the wall.

The floor of the portico must be laid with German Tile on a six inch bed of gravel. A granite base two feet square and eight

inches thick must be laid under each iron column. Granite flags eight inches thick must be built into the angles of the tower, to foot the principals of the spire upon.

Scrapers, hydrant and spout stones, cellar window and vault curbs will be required to make a complete finish. A granite curb eight inches thick (for the pavement) must be laid along the entire front on both streets; also a base of the same material twelve inches thick and                      deep, with steps and check blocks, must be set on the line from the north-west corner of the lot to the southern extremity of the same on Seventeenth Street.

#### BRICK WORK.

All the arches in the cellar and under the portico must be of good hard brick carefully laid in sharp mortar.

All the piers, arches and walls throughout the entire building, not marked for stone or wood, must be of good well-burnt brick, of the thickness laid down on the plans. The entire front on both streets, together with the interior of the portico and external surfaces of both towers must be faced with best pressed bricks of a uniform colour. The west and south walls of Church and Lecture Room must be faced with best back front stretchers. The whole of the brick work must be laid in the most careful manner in strong, sharp mortar, except the pressed brick, which shall be laid in white mortar.

Relieving arches must be turned over all openings, and all flues, both smoke and ventilating, must be carefully pargetted. The pavements must be laid with best paving brick on a six inch bed of gravel. The usual proportion of salmon brick may be used in the interior of all walls except those of the principal tower.

#### CARPENTERS' WORK AND LUMBER.

All joists throughout must be of sound white pine or spruce; 3x12, well seasoned and laid not more than sixteen inches from centre to centre, with three rows of diagonal bridging in each bay.

The gallery joists shall be 3x10, same quality as the others, framed into white pine girders 5x12, trussed between the columns with struts and iron rods, as shown on the working drawings. The



timbers for the sixth and seventh floors in the principal tower must be of oak 4x12, each bolted together and framed as shown on Section C D. Every joist must be backed, and all flues and openings framed. All trimmers must be doubled, when there is more than one tail joist.

The girders to support the Sabbath School Room shall be of White Pine, in four pieces, 5x12, trussed and bolted, as shown on the working drawings.

The principals in Church and Lecture Room roof, and roofs of spires, shall be of sound white pine, of the size marked on the section, and framed, trussed and bolted, as shown on the same. The top of the spire, immediately below the finial, shall be of solid timber, with an octagonal tenon, around which the top ends of the principals must be bolted. The lower ends of those in principal spire must be fitted into notches, cut in the granite blocks already mentioned, and secured by one inch and quarter round iron rods, extending through the sixth floor, as shown on the transverse section.

#### ROOFS.

The purlins in Church and Lecture-Room roofs shall be of white pine, 4x10, notched down four inches upon the principals. The ceiling joists may be of hemlock 3x5, laid upon the top of the tie beams, and not more than sixteen inches from centre to centre. The open rafters or archivolt below the ceiling must be framed of white pine and filled with perforated panels. All the roofs except those of the spires must be covered with good quality sheathing boards, well secured to the rafters. The principal spire must be covered with best cedar shingles, laid with ornamental butts; the angles shall be covered with moulded ridge pieces of white pine. The small spire must be sheathed with closely jointed good pine boards, planed and tongued. Perforated panel work must be planted on each face, and protected at the exposed joints by tin flushings, neatly fitted over the lower edge of panels. All the cornices, caps, ornaments, mouldings and carvings, (not otherwise specified) on the

front and towers, together with the principal members of the flank cornice, must be of sound white pine, well seasoned, and cut according to the drawings.

#### FLOORS.

All the floors in the Aisles, Lecture-room, and Sunday-school rooms must be of the best quality Carolina flooring; all other floors may be laid with second quality boards.

#### STAIRS.

All stairs must be strongly horsed, and have the half paces and bandings well framed and secured into the walls. The steps must be not less than one inch and three quarters thick, best yellow pine or ash, with yellow pine risers glued and blocked together. All the steps must be let into the string board; two, two and a half inch turned walnut balusters will be required on each step. The rails shall be of mahogany or walnut, five and one half inches wide, starting from nine inch walnut newels. Rough plank steps on strong horses must be made for the cellars.

#### WINDOW FRAMES.

All the window frames must be of sound lumber, free from sap and knots, and have yellow pine pulley stiles, and yellow pine heart sills.

#### SASH.

The sash for church must be one and three quarter inches thick, double hung on best axle pullies, with patent cord. The rose windows for gallery shall be two and a half inches thick, hung to slide up in the wall. The sash for Lecture-room and Sunday-school shall be one and three quarter inches thick, double hung, same as church. Common sash hung with butt hinges must be put in the cellars.

#### DOOR FRAMES.

All outside door frames must be made of sound heart scantling, with reveal mouldings on the outside, same as the windows; all those on the inside to be of two inch plank, well secured to the brick jambs.

## DOORS.

All outside doors and doors on the first floor of Church must be of two thicknesses, of best inch and a half plank, well screwed together; all others may be single, one and three-quarters thick; the whole to be paneled according to the drawings.

## SHUTTERS.

All the first story windows (except in the Church) to have one and a half inch panel shutters.

## WASHBOARD.

All the wash-boards throughout shall not be less than eight inches high with a two inch base moulding, except in the vestibule of the Church, where it shall be twelve inches deep with a three inch plank sub.

## PEWS.

All the pews to have paneled doors and ends, inch and a half thick, with inch backs and seats, planed smooth; the arms and back rails to be of two and a quarter inch pine plank. Inch white pine lining must be secured to the walls along the ends of the pews, and coped at the height of the back rails.

## PULPIT.

The pulpit shall be of white pine with all exposed joints glued. The desk must be enclosed with a perforated railing. The steps shall be square without nosings; a small desk and platform with pilasters and entablature will be required in the Lecture Room, and the same without entablature in the Sunday School Room.

## GENERAL FURNISHING.

There shall be seven ventilators in the ceiling of the Church, about eight feet diameter, filled with perforated wood work, and two in the ceiling of the School Room. Trap doors with cords and pulleys will be required to close these ventilators. The Church doors and windows shall be finished inside with two and a half inch coves upon the plank sills. The windows in the Lecture Room shall have inch and a half beads upon plank sills nosed; the doors shall be

finished with six inch architraves. The gallery shall be panelled and ornamented as per details, and lined with white pine boards, tongued and grooved. Inch and a quarter panel doors with air panels in the top will be required for each of the privies. Two venetian screens must be made for the entrances of the same. A smooth fence, seven feet high, of good pine fencing, tongued and grooved and well secured to red cedar posts, must be put up on the west and south lines. All corners throughout must have staff beads, and every matter of carpenters' work, necessary to make a complete finish will be required, such as brackets for cornices, coverings for spouts, pipe, centres for arches, scaffolding, &c.

#### HARDWARE.

The centre doors in front, the outside doors to galleries and vestibule, also outside doors to Lecture Room must have first-rate eight inch store locks and flush bolts. All inside doors to have best quality upright mortise locks and flush bolts when double. All pews to have small bolts and ornamented slip butts. All the shutters to have strong flat bolts, rings and tarn buckles.

#### BLACKSMITHS' WORK.

All the bolts, straps, and ties for the roofs and spires to be of best American iron. Anchors must be built into the walls at every pier to tie the gallery; stays will be required on all the long window frames, and angle pieces to strap the spire framing. Two swinging gates must be put on Seventeenth Street, opening into the cellars. Two vault grates with hooks and chains must be put in the coal vaults.  $\frac{7}{8}$  round bolts will be required for the gallery fronts and Lecture Room girders. Camber rods, inch and a quarter thick, will be required for the latter. One hundred anchors must be distributed throughout the building.

#### CAST-IRON.

The columns in the Church must be not less than seven inches diameter and one inch thick. Strong flanges must be cast at the couplings where they shall be bolted together. These columns must be ornamented with carved capitals as shown in the working draw-

ings; the heads of the king bolts in the roof must be of cast-iron, together with the sill strips for outside doors. Cast spout boxes must be put on all conductors and ornamental gratings in all the cellar windows. Scrapers will be required to all outside doors. A strong iron railing and gates, as per plan of the same, must enclose both fronts on Spruce and Seventeenth Streets. A neat railing will also be required on the steps to Trustees' room and Pastors' study. Lightning rods with platina points of the most approved kind must be put on both spires.

#### PLASTERING.

All interior surfaces usually plastered must be finished white in three coats of best lime, sharp bar sand and sound hair, and must be entirely free from chip cracks. The principal ceiling must be paneled and otherwise finished as shown on the plan of the same. Cornices will be required on all the ceilings in the Lecture Room building and vestibules of Church, not less than sixteen inches girth. The recess behind the pulpit shall be ornamented as shown on the plans of the same. The whole of the plastering in the Church proper must be floated for fresco painting. A small ornament must be run around the ventilators in the Lecture Room, and also in the Sunday School Room. The contractor must furnish, set up, and take down any scaffolding that may be required by the fresco painter.

#### HEATING AND VENTILATING.

Four first class Culver heaters must be put into the cellars of the buildings as designated on the plans, and finished and completed for use with all valves and registers. The registers in the Church floor to have marble curbing. Three of Collin's Patent Ventilators, three feet in diameter in the cylinder, must be put on the roofs of the Church and Lecture Room. Ornamental ventilating registers must be put on all the ventilating flues.

#### PLUMBING.

A neat hydrant must be placed by the privies in each yard, and a stationary basin with plated cocks in the pastor's study, also a first-rate water-closet with china basin, trap and reservoir complete.

## TIN WORK.

The whole of the roofs must be covered with best crossed double leaded tin, having three coats of paint on the upper side. All the chimneys and battlements must be flushed, puttied, and made perfectly water-tight. All projecting cornices and caps must be covered same as roofs. The water shall be taken off in five inch conductors.

## G A S.

Gas pipes of suitable dimensions to supply lights at the points marked on the plan, must be introduced.

## PAINTING AND GLAZING.

All exposed wood, iron and tin-work, (including the roofs of both spires,) outside and in, must have four coats of best zinc paint and linseed oil. All outside ornaments, window and door frames, cornices, &c., must have two coats of sand and made to imitate Connecticut freestone. The wood-work in the interior, together with all doors and sash, must be grained oak or walnut in the best style; also, the plaster cornice around the principals. The Lecture and Sunday School Rooms must be finished white except the doors and sash. The entire Lecture Room building, and cellars of both buildings shall be glazed with best American glass. The Church and towers shall be glazed with double thick glass, white enamelled on both sides and ornamented with small figures in each pane. The contractor must state the cost for the enamelled glass in his proposal, so that the committee may know the amount of deduction should they conclude to furnish stained glass instead. The front windows and windows in the towers shall have lead sash similar to those in First Reformed Presbyterian Church, Broad Street. The whole of the glazing must be back puttied, sprigged, and executed in the very best manner. The Committee shall furnish any fresco painting which may be required.

SEVENTH.—The whole work to be entirely finished and completed, and the said building to be made ready for occupancy on or before the first day of January, A. D. 1857, and the streets in front of

and bounding said building to be entirely cleared from all obstructions, at such date, or as much sooner as can be, consistently with the completion of the work.

EIGHTH.—That the said \_\_\_\_\_ Builder, shall, upon the execution of these presents, furnish his bond or obligation in writing, with warrant of attorney to confess judgment therein forthwith to the amount of ten thousand dollars, to be given to the said “The West Spruce Street Presbyterian Church” to be held by them as security for the faithful performance of this contract, and until a full and legal release shall have been duly executed by all persons, who, under the laws of the Commonwealth of Pennsylvania, could or might file any lien or liens on the aforesaid buildings, with their appurtenances.

NINTH.—And it is hereby covenanted and agreed by and between the said parties hereto, that in case default shall be made by the said \_\_\_\_\_, his executors or administrators in completing and finishing the said buildings with their appurtenances, in accordance with the agreements herein contained, and delivering the same to the said “The West Spruce Street Presbyterian Church” and their successors, on or before the first day of January, A. D. one thousand eight hundred and fifty-seven. It shall and will be lawful for the said “The West Spruce Street Presbyterian Church” and their successors, to keep and retain out of any monies in their possession to which upon final settlement as hereinafter provided, the said \_\_\_\_\_ his executors and administrators might or would be entitled, the sum of four hundred dollars for each and every calender month, that default shall be made as aforesaid, as liquidated damages due by and received from the said parties so in default, and which said liquidated damages the said \_\_\_\_\_ for himself, his executors and administrators do hereby covenant and consent to be charged with and to pay the same to the said “The West Spruce Street Presbyterian Church” and their successors.

TENTH.—And it is hereby further covenanted and agreed by and

between the said parties hereto, that upon the execution of these presents, the said shall and will purchase from the said "The West Spruce Street Presbyterian Church" all the building stone, say about one thousand perches more or less, now or about to be deposited on or near the lot of ground whereon the aforesaid buildings are to be erected, and pay therefor in four instalments the full amount paid for the same by the said "The West Spruce Street Presbyterian Church," to be settled for and deducted from the first four payments to be made as hereinafter provided.

ELEVENTH.—That the said shall deliver up the said premises to the said "The West Spruce Street Presbyterian Church," freed and discharged from all liens, claims and demands of material, men, mechanics and others, for which liens, claims and demands of every nature, a full release shall be obtained and furnished to said "The West Spruce Street Presbyterian Church" or their Architect.

TWELFTH.—And in consideration of the faithful performances of all this contract "The West Spruce Street Presbyterian Church" shall and will, well and truly pay or cause to be paid unto the said his executors and administrators the sum of dollars, in the several proportions and at the several times hereinafter mentioned for payment thereof, that is to say  
dollars when the cellars are excavated,  
dollars when the foundations and cellar walls are built,  
dollars when the first floor of joists are laid,  
dollars when all the first story windows are set, dollars when  
the gallery joists are on, dollars  
when the rose windows are set,  
dollars when the roofs are raised,  
dollars when the tin work is completed,  
dollars when the buildings are ready for plastering,  
dollars when the plastering is finished,



dollars when the whole is ready for painting, dollars when the painting and glazing is completed inside, and the balance dollars when all the releases are signed and given up with the building into the hands of the said "The West Spruce Street Presbyterian Church," and it is mutually agreed upon between and by the said parties as follows:

THIRTEENTH.—That in the event of the death of the said during the progress and before the completion of the said work, the said is to be fulfilled and completed, and the terms of this contract complied with and fulfilled by his legal representatives, and if they shall not commence so to perform and fulfil the same within days after the death of said a fair estimate of the said work, so far as the same may have progressed, shall be made by the Architect for the time (according to the provisions hereinafter made,) and the estimated value thereof shall be paid to, and the same shall be accepted by the legal representatives of said, which estimate shall be final and conclusive thereby, and the said "The West Spruce Street Presbyterian Church" shall be at liberty to complete said work without any interference upon their part.

FOURTEENTH.—That in the event of the death of the said John McArthur, Jr., Architect, before the completion of said work, Elias Johnson is substituted as said Architect, with the like powers and authority, and subject to the same provisions as are conferred and set forth in this contract.

FIFTEENTH.—That all additions to and alterations in the Specifications herein contained, shall be in writing, and shall not in any way affect this contract, nor shall there be any extra charge for any such alterations, additions and extra work, unless the same is made by written agreement signed by these parties.

SIXTEENTH.—And it is hereby further covenanted and agreed by and between the said parties hereto, that the said "The West Spruce

Street Presbyterian Church" and their successors shall be represented in all matters, agreements, alterations, settlements, supervision and other necessary acts whatsoever, relative to or concerning the erection and construction of the said building with its appurtenances, by a Building Committee duly appointed by the said, "The West Spruce Street Presbyterian Church" and their successors, and all said agreements or acts of said Building Committee shall be valid and binding to all intents and purposes upon the said "The West Spruce Street Presbyterian Church" and their successors, and the said his executors and administrators, as if personally entered into by and with the said "The West Spruce Street Presbyterian Church," under their corporate seal.

And for the faithful performance of all and every the contracts, agreements and promises hereinbefore contained and set forth, on the part of the said to be kept and performed, the said doth bind himself, his heirs, executors and administrators, to the said "The West Spruce Street Presbyterian Church" and their successors, by these presents, and for the faithful performance of said sums of money as hereinbefore contained on their part to be kept and performed. The said, "The West Spruce Street Presbyterian Church," do bind themselves and their successors to the said his executors, administrators and assigns.

IN WITNESS WHEREOF, The said "The West Spruce Street Presbyterian Church have caused these presents to be sealed with their corporate or common seal, and the said hath hereunto set his hand and seal this day and year first above written.

## **Appendix B**

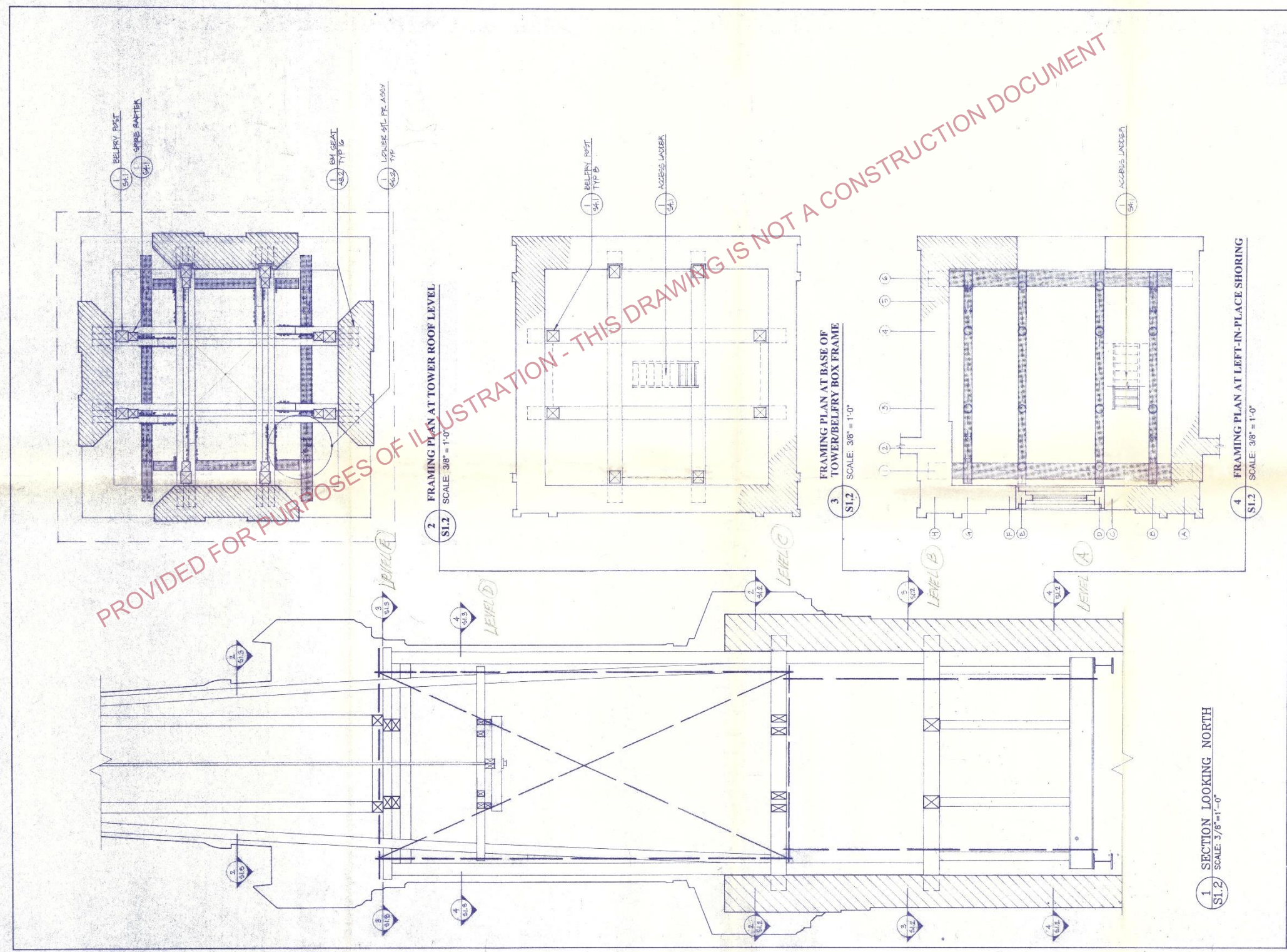
Watson & Henry Associates, *Steeple Restoration: First Presbyterian Church of Salem, New Jersey*, 1996, architectural drawings by Holly A. Boyer, retrieved from the Keast & Hood Archives, Philadelphia, PA.

These drawings are provided for the purposes of illustration.

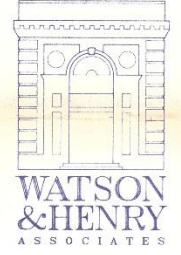
The drawings are not Construction Documents.



PROVIDED FOR PURPOSES OF ILLUSTRATION - THIS DRAWING IS NOT A CONSTRUCTION DOCUMENT



REV	DESCRIPTION	BY	DATE



Michael C. Henry, PE, AIA, Principal  
 Professional Engineer, NJ PE 25633  
 Registered Architect, NJ RA 11115

Penelope S. Watson, AIA, Principal  
 Registered Architect, NJ RA 10019

THE BOARD OF TRUSTEES  
 FIRST PRESBYTERIAN CHURCH  
 88 Market Street  
 Salem, New Jersey 08079

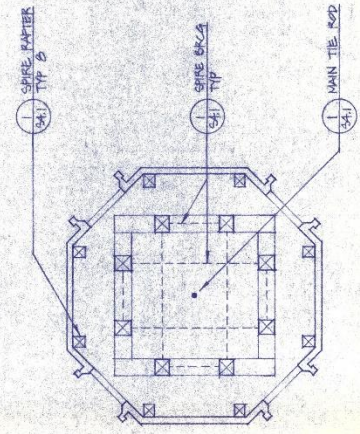
BELFRY/TOWER FRAMING PLANS & SECTION  
 STEEPLE RESTORATION  
 FIRST PRESBYTERIAN CHURCH  
 88 MARKET STREET  
 SALEM, NEW JERSEY

DRAWING NUMBER: **S1.2**  
 SHEET 11 OF 17

PROJECT NO. 93005.3  
 SCALE: 3/8" = 1'-0"  
 DRAWN: H4B

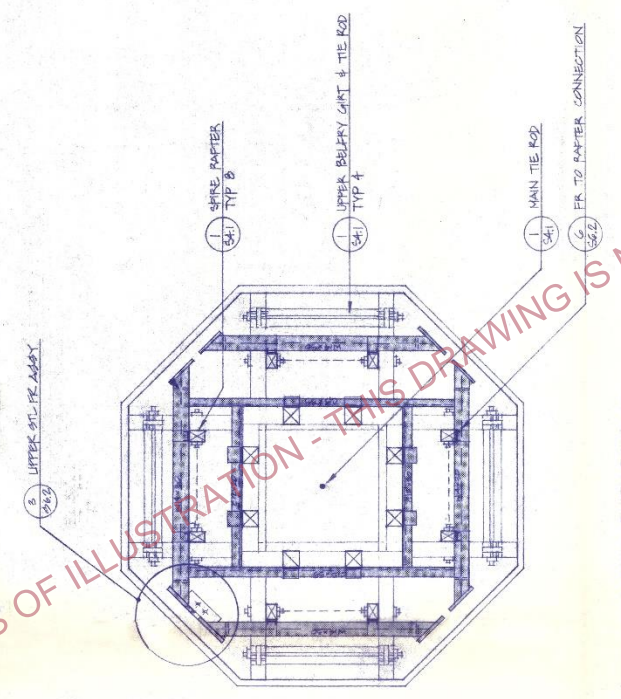


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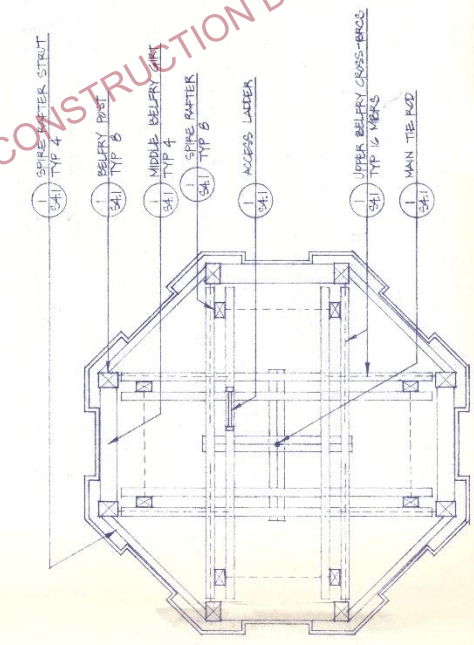


2 FRAMING PLAN AT BASE OF LOWER SPIRE BOX FRAME  
S1.3 SCALE: 3/8" = 1'-0"

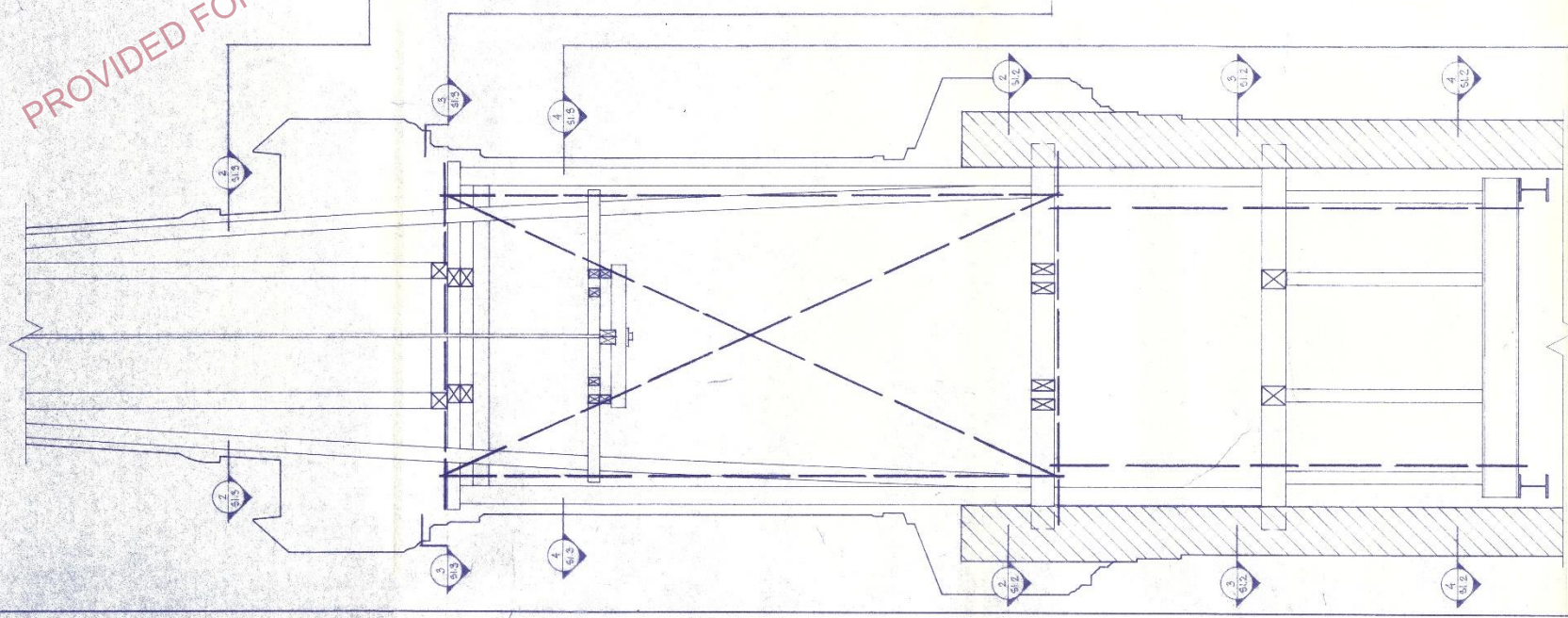
UPPER 9/16" FR. OMITTED FOR CLARITY



3 FRAMING PLAN AT TOP OF TOWER/BELFRY BOX FRAME  
S1.3 SCALE: 3/8" = 1'-0"

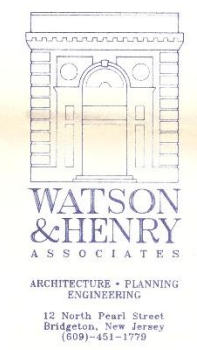


4 FRAMING PLAN AT CLASPING STRUTS  
S1.3 SCALE: 3/8" = 1'-0"



1 SECTION LOOKING NORTH  
S1.3 SCALE: 3/8" = 1'-0"

REV	DESCRIPTION	BY	DATE



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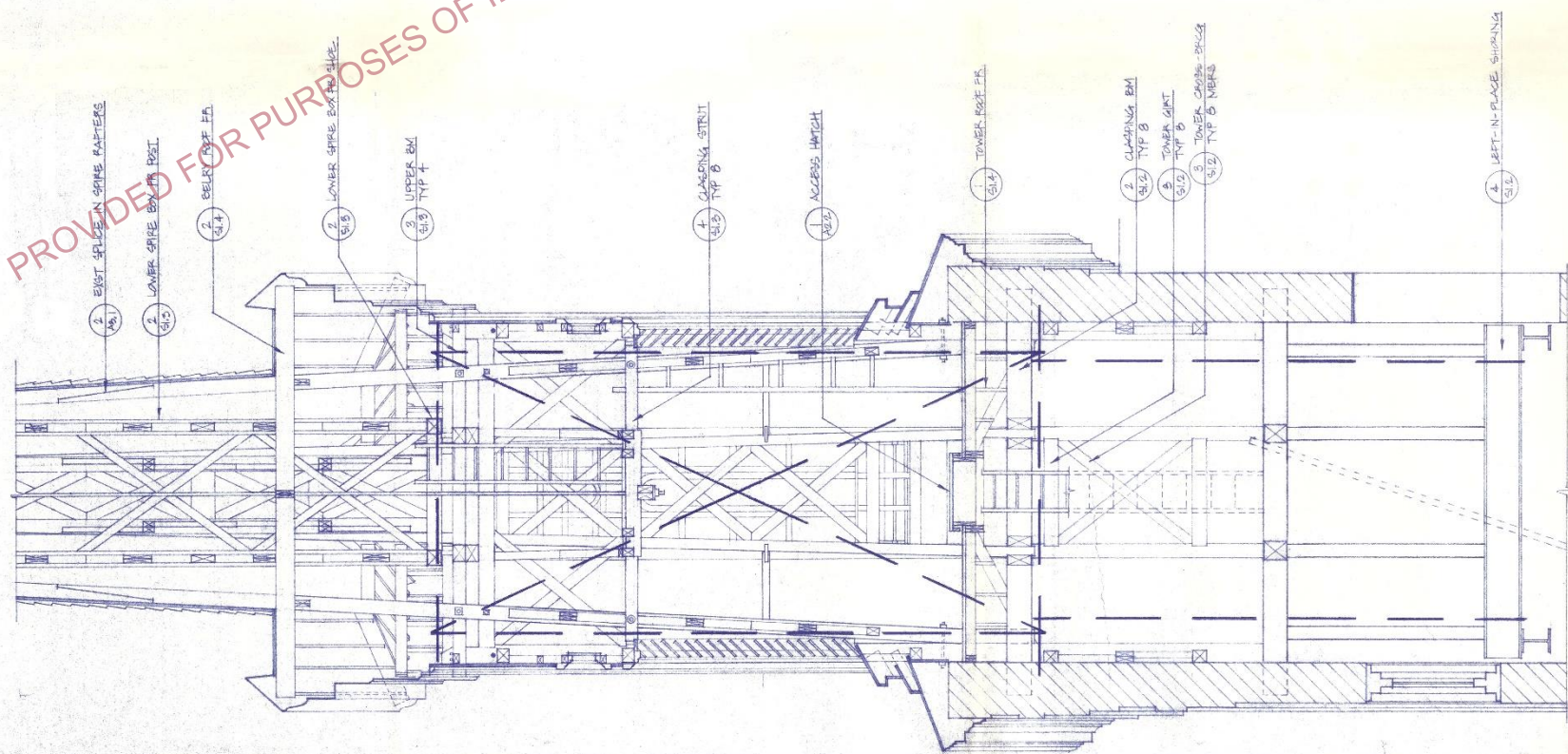
BELFRY/TOWER FRAMING PLANS & SECTION  
 STEEPLE RESTORATION  
 FIRST PRESBYTERIAN CHURCH  
 88 MARKET STREET  
 SALEM, NEW JERSEY

DRAWING NUMBER PROJECT NO. 93005.3  
 S1.3 SCALE: 3/8" = 1'-0"  
 DRAWN: HAD

SHEET 12 OF 17



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1 TOWER/BELFRY BOX FRAME - SECTION LOOKING NORTH  
S4.1 SCALE: 3/8" = 1'-0"

REV	DESCRIPTION	BY	DATE

**WATSON & HENRY ASSOCIATES**  
 ARCHITECTURE • PLANNING  
 ENGINEERING  
 12 North Pearl Street  
 Bridgeton, New Jersey  
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THE BOARD OF TRUSTEES  
 FIRST PRESBYTERIAN CHURCH  
 88 Market Street  
 Salem, New Jersey 08079

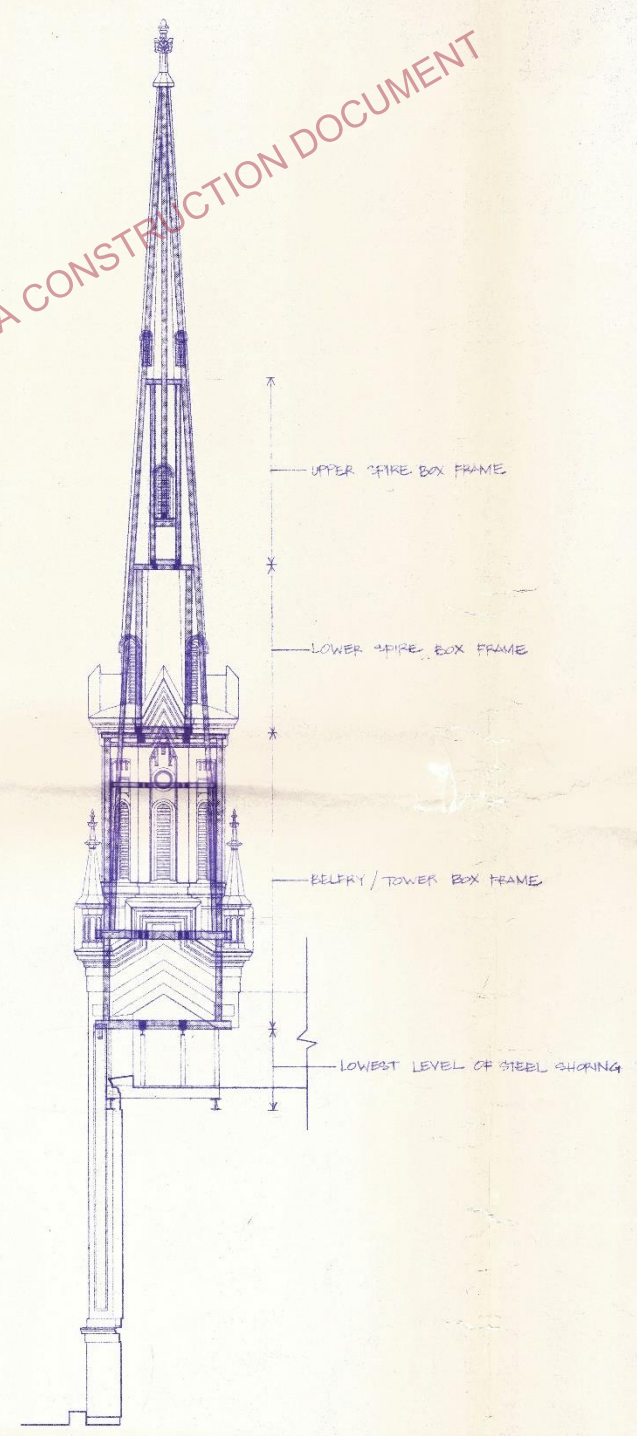
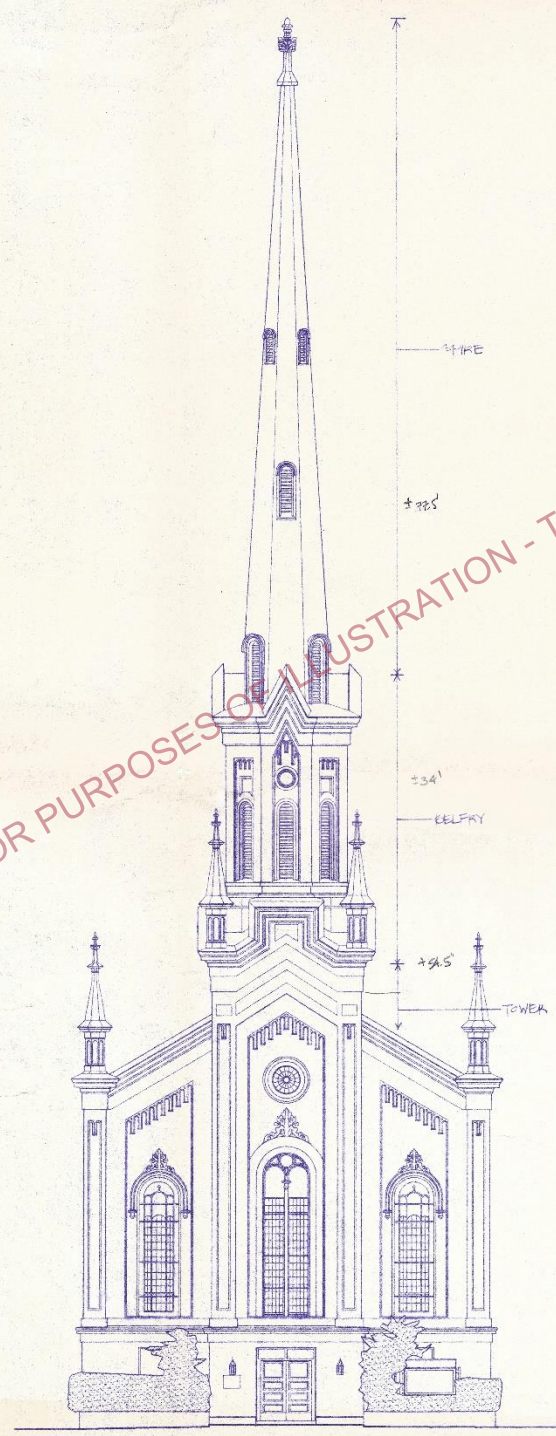
BELFRY/TOWER ATTIC SECTION  
 STEEPLE RESTORATION  
 FIRST PRESBYTERIAN CHURCH  
 88 MARKET STREET  
 SALEM, NEW JERSEY

DRAWING NUMBER **S4.1** PROJECT NO. 93005.3  
 SCALE: 3/8" = 1'-0"  
 DRAWN: HAD

SHEET 14 OF 17



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NOTES:

REV	DESCRIPTION	BY	DATE

**WATSON & HENRY ASSOCIATES**  
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 12 North Pearl Street  
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 (809)-451-1778

Michael C. Henry, PE, AIA, Principal  
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Penelope S. Watson, AIA, Principal  
 Registered Architect, NJ RA 10019

Board of Trustees  
 First Presbyterian Church of Salem  
 88 Market Street  
 Salem, New Jersey 08079

**STEEPLE RESTORATION**  
 FIRST PRESBYTERIAN CHURCH  
 88 MARKET STREET  
 SALEM, NEW JERSEY

DRAWING NUMBER: **SK1** PROJECT NO. 93005.3  
 SCALE: 1/8"=1'-0"  
 DRAWN: \_\_\_\_\_ DATE: 25 JAN 1996

SHEET 1 OF 4













## GLOSSARY

**arcuated** Based on, or characterized by, arches or archlike curves or vaults.

**band course** See belt course.

**battlement** A fortified parapet with alternate solid parts and openings, termed respectively “merlons” and “embrasures” or “crenels” (hence crenellation).

**belfry** A bell tower, or section of a steeple that supports a bell.

**bell cote, or bell-cote** A small belfry astride the ridge of a church roof, often crowned with a small spire.

**belt course, band course, or string course** A horizontal band of masonry extending horizontally across the façade of a building and occasionally encircling the entire perimeter; usually projects beyond the face of a building and may be molded or richly carved.

**biforiated** divided into two openings, such as doors or windows.

**blind oculus** A oculus in which the opening is permanently closed by wall construction.

**broach spire** A spire springing from a tower without an intermediate parapet.

**buttress** An exterior mass of masonry set at an angle to or bonded into a wall which it strengthens or supports. Sloan uses the word to describe the exterior corners of towers where the masonry is thickened and topped by finials. (Sloan, 1852)

**Byzantine style** An architectural style based on the architecture of the Byzantine or Eastern Roman Empire which developed from Early Christian and late Roman antecedents in the 4<sup>th</sup> century, spread widely and lasted throughout the Middle ages until the fall of Constantinople to the Turks in 1453.

**Byzantine Revival** The reuse of Byzantine forms in the second half of the 19<sup>th</sup> century; an architectural mode found to a limited extent that borrows special features of Byzantine architecture, including pendentive-supported domes, round arches, elaborately decorated columns and capitals.

**“clasping” members** (Jan Lewandoski, 1996) See partners.

**corbel table, or corbel course** A projecting stringcourse or masonry strip supported by corbels. Sloan uses the term corbel course to describe the stepped edge at the cornice along the gable end. (Sloan, 1852)

**crenel** An open space between the merlons of a battlement.

**crocket** In Gothic architecture and derivatives, an upward-oriented ornament, often vegetal in form, regularly spaced along sloping or vertical edges of emphasized features such as spires, pinnacles, and gables. Sloan uses the term to describe an ornament above the peak of a gable, which is more correctly termed a finial. (Sloan, 1859)

**cupola** A domed structure, often set on a circular or polygonal base on a roof; often louvered to provide ventilation.

**curator** In the Presbyterian Church, a member of a Committee of Curators, who act as keeper or custodian of the building and property.

**deacon** In the Presbyterian Church, members of the congregation elected to perform as outreach liaisons, with a primary focus on care for the poor and oppressed and in seeking social justice.

**elder** In the Presbyterian Church, members of the Session whom are lay persons elected by the congregation and ordained to assist the minister in the oversight and government of the church.

**embrasure** The crenels or intervals between the merlons of a battlement.

**engaged** Attached (or apparently attached) to a wall by being partly embedded or bonded to it.

**Entwürfe zu Kirchen** Designs for Churches, title of a book first published in Germany in 1844, illustrating church designs, primarily in the *Rundbogenstil* style.

**finial** An ornament that terminates the point of a spire, pinnacle, gable, etc.; distinguished from a pinnacle by its smaller size and relative simplicity.

**flag or flagstone** A flat stone, typically used as a stepping-stone or for terrace or outdoor

paving. McArthur uses the term flag in reference to “granite flags eight inches thick must be built into the angles of the tower, to foot the principals of the spire upon.” (McArthur, 1855)

**flashing, or flushing [sic.]** A thin impervious material, usually sheet metal, placed in construction to prevent water penetration and/or provide water drainage, esp. between a roof and wall, and over exterior door openings and windows. McArthur uses the terms flushing and flushed. (McArthur, 1855)

**gable** A vertical surface commonly situated at the end of a building, usually adjoining a pitched roof, most often it is triangular.

**gablet** A small ornamental gable; sharp pediment covering a spire light. (Sloan, 1865)

**Gothic Revival** A movement originating in the 18<sup>th</sup> century and culminating in the 19<sup>th</sup> century, flourishing throughout Europe and the United States, aimed at reviving the spirit and forms of Gothic forms; usually characterized by ashlar masonry, polychromed brickwork, or wood walls.

**Gothic style** The architectural style of the High Middle Ages in Western Europe which emerged from Romanesque and Byzantine forms in France during the later 12<sup>th</sup> century; characterized by the pointed arch, the rib vault, the development of the exterior flying buttress.

**Italianate style** An eclectic style of Italian-influenced architecture; fashionable in England and America from the 1840s to around 1890; commonly used in residential and commercial architecture, but sometimes applied to ecclesiastical designs.

**k-brace** Pair of wood braces in which the members extend upward and downward from a shared bearing point, creating the form of a letter “K” (Joseph Hammond, 1996).

**lantern** A windowed story comprising the base or portion of a steeple. Lanterns are generally absent in gothic-style designs.

**lesene** See pilaster strip.

**Lombard band, Lombard banding** A row of small rhythmic ornamental arches that appear to support a roofline or course, and a character-defining of the Lombard Romanesque style.



**Lombard Romanesque** An architectural style based on north Italian pre-Romanesque architecture in the 7<sup>th</sup> and 8<sup>th</sup> centuries during the rule of the Lombards, based on early Christian and Roman forms. Sometimes referred to as First Romanesque.

**Lombard style** A synonym occasionally used for the Italianate style.

**merlon** In an embattled parapet, one of the solid alternates between the embrasures.

**Norman style** An architectural style based on the Romanesque architecture of England from the Norman Conquest in 1066 until the rise of the Gothic around 1180.

**oculus** See roundel.

**parapet** A low guarding wall at any point of sudden drop, as the edge of a terrace, roof, battlement, balcony, etc.

**parapeted gable** A gable having a face that rises above the cornice line and carries a parapet.

**partners, partner beams** Paired beams placed on either side of a vertical structural member which are fastened through, thereby “clasping” the vertical member. Originates from naval architecture in which they are the typical way of anchoring masts to the body of the vessel (Jan Lewandoski, 2019). McArthur’s design for a girder refers to a similar structural arrangement as being “separate, complete in themselves, securely bolted together, leaving a space between sufficient to clear the [passing structural members].” (McArthur, 1849)

**pilaster strip, lesene** An engaged pier built up with the wall, usually applied to slender piers of slight projection; in medieval architecture and derivatives, often joining an arched corbel table.

**pinnacle** A small, largely ornamental body or shaft terminated by a pyramid or spire; distinguished from a finial by its greater size and complexity and from a tower or spire by its smaller size and subordinate architectural role.

**platina** An alloy of platinum and several other metals, including palladium, osmium, and iridium. McArthur refers to this material for the lightning rod “points,” or uppermost tip of the rod. (McArthur, 1855)

**portico** A covered entrance whose roof is supported by a series of columns or piers,

commonly placed at the front entrance to a building.

**principal** In a framed structure, a most important member, such as a truss which supports the roof. McArthur uses the term to describe both the larger east spire, differentiating it from the smaller west spire, and the rafters (8 each) of the spires. (McArthur, 1855)

**rabbet, or rabbit [sic.]** A longitudinal channel, groove, or recess cut out of the edge or face of a member; esp. one to receive another member, or one to receive a frame inserted in a door or window opening. Rabbit [sic.] in some nineteenth century publications refers to assemblies of lumber sawn and nailed together to create traceries, or divisions between windows. (*Plans for Churches and Parsonages*, 1852)

**Romanesque Revival** A term sometimes applied to the architectural style of Richard Upjohn (1802-1878), and other later architects.

**Romanesque style** An architectural style emerging in Western Europe primarily in the 11<sup>th</sup> century and lasting until the advent of Gothic architecture in the 12<sup>th</sup> century; based on Roman and Byzantine elements; usually characterized by round arches and massive articulated walls; served as the basis for Romanesque Revival.

**roof crest** An ornament of a roof, generally highly decorative.

**roundel** A small circular panel or window; an oculus.

**Rundbogenstil** (Round-arch style) A nineteenth-century historic revival style of architecture popular in the German-speaking lands and the German diaspora; it drew on the Norman, Lombard, Byzantine, and especially German Romanesque. (M. Lewis, 2019)

**scissor brace** Pair of wood braces in which the members cross each other.

**session** In the Presbyterian Church, a body of elected elders governing each local church within Presbyterian polity.

**skirting roof, skirt-roof** A small eavelike projection from a façade between two stories, usually encircling the building; In steeples, a skirting roof is typically at the transition between the belfry and spire above.

**spire** Any slender pointed construction surmounting a building; generally a narrow octagonal pyramid set above a square tower. Sloan describes a spire as an acutely pointed

termination or covering, most usually found on towers of churches, or turrets. (Sloan, 1865)

**spire light, or spirelight** A small glazed, or vented, opening set into the tapering side of a church spire; generally associated with the Gothic style. Sloan elaborates that they are arranged in tiers, the faces of which are vertical, and therefore projected out at the top from the sloping sides of the tower. (Sloan, 1865)

**steeple** A tall ornamental structure composed of a series of stories diminishing in size and topped by a spire or cupola; the entire assemblage rising above the plate and roof of a building. The steeple's lower and sturdier part is usually called the tower, and above that are found belfries, lanterns, cupolas, spires, pinnacles, finials and vanes. (Lewandoski, 1995)

**string course** See belt course.

**teller** In the Presbyterian Church, a member of the congregation having the duty of counting money, keeping a record of monies given, preparing bank deposits and making bank deposits.

**tenon** The projecting end of a piece of wood, or other material, which is reduced in cross section, so that it may be inserted in a corresponding cavity (mortise) in another piece in order to form a secure joint. McArthur uses the term to describe the top end of a solid piece of timber at the top of the spire to which the top ends of the principals [rafters] must be bolted. (McArthur, 1855)

**tongue** A projecting member on the edge or end of a wood member; intended to be fitted to another member to form a joint.

**tracery** Curvilinear openwork shapes of stone or wood creating a pattern within the upper part of a Gothic window, or an opening of similar character, in the form of mullions which are usually so treated as to be ornamental. By extension, similar patterns applied to walls or panels.

**trustee** In the Presbyterian Church, a member of the Board of Trustees, whom only have authority that has been delegated to them by the Session.

**vandyke** Some form of decorative recess in carpentry; “[spires in Normandy] are generally ornamented externally with shallow *vandykes*, little arches, or other similar patterns cut



on the surface.” (Sloan, 1856)

**vane, weather vane** A metal plate, often decorated, or in the shape of a figure or object, which rotates freely on a vertical spindle to indicate wind direction; usually located atop a spire.

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