

These are the original records of Henry Hibben Richardson, the architect of Trinity Church. This is the working of the lowest audience, which provides a foundation which the many accounts of his famous building can be squared against.

Occasional paragraph headings have been added to help readers navigate references abstractly long sentences and paragraphs. In time I also hope to find someone who might add illustrations.

David Woodruff, 1999

A Description of Trinity Church

by The Architect, Henry Hibben Richardson

At the time of the burning of the old Trinity Church, on Sanson Street, the project for a new building was well advanced. Land had been bought, competitive designs had been invited and received, and a selection made; and a considerable amount of work had been done on the drawings for the new structure.

In a modern Church, if the logical sequence of one part from another is not so close as in a modern Cathedral, still it is so that every detail of the construction, from the least steps under fields on the roof, must be thought over, viewed in the light of all probable contingencies, and fixed with absolute definiteness, before the construction can be safely begun.

Trinity Church was an exception to this rule: the character of the design, and the nature of the ground on which the building was to stand, brought problems for the solution of which ordinary procedure failed, and which were to be worked out by accident and various fortuitous investigations.

Mapping the density of underground support

On testing the ground at the site a compact stratum was found, overlain by a quantity of alluvium, upon which a mass of gravel, about thirty feet deep, had been deposited. Upon such a foundation was to be built a structure, the main feature of which consisted in a series of eighting nearly sixteen million pounds, and supporting four spires. The first pile was driven April 21, 1871. Every pile was marked, numbered, its place marked on a plan at a large scale, and a record made of the weight of the hammer with which it was driven, the distance that the pile sank at the last three blows, and the height from which the hammer fell. With these indications, a map of the bearing capacity was made, with contour lines, showing the surface of the clay bed.

Stone from the local church used in the foundation

Meanwhile, the preparation of the plans for the superstructure was going on, and the last of the five thousand, four hundred-piles which support the building had on them drawn before the masonry work was begun. On the 15th of October, 1873, the contract was made with Messrs. Messers. Brothers, of Wisconsin, Wis., for the masonry and carpenter work of the structure; the Building Committee, who had a large quantity of stone on the ground brought from the ruins of the Roman-Catholic Church, undertaking to furnish all the foundation stone, except that for the great piers of the tower, which it was necessary to construct of special stone. Under the action of the Church, a square stone five square feet had been reserved for the tower foundation, and this had been delivered uniformly full of piles, as near together as practicable, over two thousand being contained within the area. This area, while the foundation walls for the other parts of the Church were building, was subjected to various processes, in preparation for its future use.

Concrete stabilized the underground piles

The piles within these limits were cut off at "grade line," six inches lower than the piles under the other portions of the building, as an exercise of precaution against any failure of water in keeping the ground saturated. The ground was then excavated around the heads of the piles to a depth of two feet, and replaced with concrete. The concrete was mixed on the ground just like mortar, and absorbed as much water as it could on the head of the piles on its installation, and then run into the excavation. Four successive layers, each six inches thick, were put in, and each thoroughly compacted with several courses. The upper surface of the concrete was kept one inch below the heads of the piles, on the theory that the piles being the true support of the structure, it was important that every course should rest evenly upon them, without coming in contact with the concrete, which might cause them sink, by the settlement of the ground filling, and cause disturbance of any masonry which might rest partly upon it and partly on the supporting piles. The concrete, however, has been kept on over in preventing lateral motion of the piles, and in some cases connecting them together.

Piles and grout laid

Before the close of this season, the first course of one of the five grout-locks which for the foundation of the tower piers, had been laid on the piles, and as an experiment the outside joints were cemented up, and the whole then grouted with cement and sand, and the joints and the space between the stone and concrete were thickened. The pumping, which had been constantly kept up to free the excavation from the water which came in through the poorly bottom, then ceased, and the water was allowed to cover the cavity, which it soon filled to the depth of about four feet, and the operations on the ground were suspended until the following spring. During the winter, however, extensive preparations were made for the following season.

Driftless granite not sufficient for the need.

Chicago had been made of the Driftless granite for the walls, and of Congamogog granite for the masonry, and cut stone-work, and the contractors had laid and opened quantities of their own,

both at Gresham and Longwood. The Gresham granite is a fine grained mass, of beautiful color, rather resembling a sandstone in effect, and harmonizing very well with the brown limestone, but, like the second granite, being only found at the surface of the quarry, there was difficulty in procuring enough for the water table and some other portions, so the same amount of or other materials which had changed the upper part of the granite ledge from its natural gray to a rich color, had used the Niagara stone, impervious at first, but which deteriorated, by the falling in pieces of the larger masses while being downward.

Granite came from five locations

To meet difficulties, work was made and a red granite found at Westley, N.Y., which although not a surface stone, and less delicate color than the Gresham, was of admirable quality, pieces many feet long in size being readily procured. The contractor, with generous and extensive, excavated here, and opened a third quarry, from which we obtain all the stone below and including the water table, as well as a portion of the largest foundation stones.

In all these quarries, work was procured through the stone, and a large quantity of material accumulated, besides many hundred tons of dimension granite of various kinds, for the foundation of the gas pipes, the which courses had been previously made, and which was procured from various locations, partly from Rockport, Mass., part from Quincy, and some of the best came from the coast of Maine. These were all large stones, weighing from one to four tons each, and as the work for which they were destined was the most important as well as the most trying, in the building they were accepted only under some restrictions, no stone being received of less height than twenty or more than twenty four inches, or less than four feet long, and a certain proportion were required to be eight feet long, or over more.

Submerged masonry required

On commencing operations in the spring of 1874, it was found that the tide water coming in through the ground had affected the setting of the concrete. The concrete was in a favorable condition, but the grouting of the masonry which had been executed the year previous, was still very soft, although made with concrete which, under ordinary circumstances, sets rapidly. In view of this exceptional difficulty, as well as the need for being able to proceed rapidly with the plans, without being obliged to wait for the setting of any doubtful concrete, it was thought best to reduce the mortar consistency by using Portland cement throughout the joints. A variety of English, French and Portland cements was tried, but the results proved equally good with all, some difference in the rapidity of setting being the principal variation. The cement already on hand was taken up and used, and, with the substitution of the different cements, proved as before, the water joints being packed dense, and the inside ground still completely full.

As first the Portland cement was handled like the sand in similar circumstances, the cement being mixed rather dry and after being put into the joints with trowels, compressed as much as possible with trowels, but further experiments, and careful trials, showed equally good results by first filling the larger joints with cement and the larger masses, and then mixing some rather rich cement, sufficiently liquid to pour into the smaller joints from a bucket, stirring it well with the trowel portion, until the whole was of a medium consistency, and had penetrated every interstice

of the same work. Each course was levelled up to a uniform surface with cement and chips, where necessary, before the next course was begun, and the upper end of the third course from the top, and all the vertical and horizontal joints of the two upper courses were taken out of vertical and pointed on a line from a perfectly close joint.

The walls above of 1873, the four pyramids of solid granite, each thirty-three feet square at the base and seven feet square at the top, and seventeen feet high, were completed; the main walls of the Church being then well advanced, and the Chapel, which had been begun forward with great rapidity, nearly finished. In the construction of other foundations than those of the tower, the stones, which had been brought from the ruins of the old Church in other places, were utilized as far as possible, but the action of the frost upon them had produced some serious results, very unfavorable to their use in a new building. The stones, which were simply cracked through were rarely managed, but many of the courses, which when delivered on the ground were as square and neatly jointed as anyone could wish, on being placed in the wall by tall large chips from the courses, came in the side toward the interior of the tower. These would be followed by successive shells, separating like the coats of an onion, and apparently of indefinite number.

This scaling took place first at the corners and, as the concrete layers fell away, the stone was reduced to essentially completely useless for building purposes. The best and largest of the old stones, those from the tower, had been most exposed to the fire, and were most subject to this defect. Even after a stone had been safely placed in the wall, and was apparently perfect, the imposition of the next course would sometimes cause shells to separate from the upper courses of the tower already laid, so that the stones above them stood on the outside of a corner surface, which is not impossible to see, and both courses had to be removed. The only course was of setting the stones was by making them with a hammer, unless the cleaving of the second course could by a fully experienced be distinguished from the fall out of blocks, which contained latent cracks. The defective stones were then separated from the mass, and rejected.

The upper building was constructed from a great stage

In November, 1873, the Chapel building was finished; the canopy, transept and side walls, as well as the various floors, being then high above the ground. During the winter, the stone for the remainder of the building was on the larger portion of the work being upon the granite for the upper part of the piers, which carry the tower. These were built of blocks of Westport granite, each five feet by two and one-half, and twenty inches high, with hammerset vertical and horizontal joints. There were laid in the courses, in pairs, forming a pillar five feet square in section, the joints of alternate courses crossing. For laying these piers and the adjoining walls, as well as the arches between the piers, a massive scaffold was built, standing independently upon the four pyramids of the tower foundation. Five stories stood upon the stone base, and ran only the pier stones, weighing two tons each, were rarely handled, but the stone was carried forward to a way the corners for the great arches, and the whole superstructure of scaffolding, to the very top of the tower, an outside staging being used. This "great stage" as it was called, remained in place for more than two years.

In the construction of the great arches, and the laying the piers at their summit to the walls of the nave and canopy, there was used, but sparingly, and as a matter of precaution, rather than

accuracy, the weights and points of application of the adjoining walls having been calculated to furnish sufficient resistance to the thrust of the arches, without the aid of ribs. In general, throughout the building, the use of iron was avoided as far as might be, and with the exception of the staircase turret, which is supported by a double set of iron beams over the vaulted forms, no masonry in the Church is dependent on metallic support. In the Chapel, where the exigencies of convenient disposition demanded some wide spans, iron beams are used, and one or two of the most beautiful are reinforced by concealed girders.

Unhappiness with lowered front

Some changes in the design were made as the work went on, in compliance with real or fancied necessities of convenience or construction, and it is curious to place, for example, the modification of neither capability the change in proportion of walls and tower than made, can hardly yet be considered as fully a vital one, so that the actual building as present looks, perhaps, the only of the original design, without admitting a new unity of its own. Especially is this the case with respect to the various windows a lowering of the Church walls, made in hope of affording an additional guarantee of good acoustic quality in the building, which was left to be a permanent consideration, changed the proportion of walls and tower in a manner which should have been counteracted by increasing the height of the various forms, including the tower which forms part of it, another amended drawing contemplated this alteration as an aesthetic necessity by the increase of height but brings a constructional necessity, and the additional one being of some importance, the full completion of the design was, to the regret of all parties, abandoned until some further time.

In modifying the internal forms to meet the new requirements, the present shape of ceiling was adopted in place of that originally intended. In the modified form the inclination over the Church under level of the wall plane, coming as the slope of the vault.

Devilling in plaster the interior

Although it was often suggested during the progress of the work, that the great piers, at least, should show the same face appears in the Church this has, nevertheless, from the first conception of the design seemed to many very undesirable, and propositions looking to that end have been, after careful consideration, always finally rejected. A rich effect of color in the interior was an essential element of the design, and this could not be obtained in any practicable manner without painting. Richwood, which might have been used through in color, would not have reduced the consumption, and the use of granite was a necessity of construction. The cold, harsh effect of this stone in the walls of the color decoration, could not be tolerated, and as between painting directly on the stone, and plastering it to receive a smooth surface, it seemed decidedly preferable that there should be no difference in texture between the piers and the other walls, but that all should be plastered alike.

The commonplace criticism that plaster "cracks construction," can hardly be considered to apply here, for the piers and arches being simply portions of the wall, it would be difficult to show any reason for plastering the other walls which would not apply equally to the piers; and that the

inner surface of the walls must in all cases be exposed, in a distance from which the most conscientious would shrink.

Revering roof life

In July, 1878, the last stone was laid in the tower. The body of the Church had already been erected in found and plastered, and in the tower itself a full floor had been built with a landing for the bellows. It remained only to erect the tower, and give up the building to the painters and the decorators. The design of the Church had always contemplated this at least for the tower, but it was with some difficulty that an entirely suitable site was found.

English stoves were imported as samples, but were not abundant to be depended on in carrying off smoke. A glazed or enamelled surface proved incapable, and this was at length found in an American site, made in Adams, Ohio, and affording some advantages in numerous respects, as well as in a vitrified surface, incapable of absorbing moisture. The color was also satisfactory in effect.

For the windows, which relieved the dryness of the ceiling, it was found necessary to erect in a distance also. Although not in themselves very large, they were beyond the size of articles usually undertaken by the Russian pattern, except the window in the city which was available by its color, and arrangements were made with the Chicago Glass Company for their manufacture. Together with the windows, were ordered top sills for the arrangement of the main tower, suitable square mold of the various towers. This construction was successfully executed, and the windows proved satisfactory in color and effect.

First chapel windows were clear

While this work was going on outside, the interior finishing was pursued without interruption. The windows were glazed with common glass, but owing to patterns of colored glass, for temporary use only, it being hoped that some, if not all the windows, would ultimately be filled with ornamental stained glass.

Lafarge's role as interior artist

As soon as the building was enclosed, the negotiations for decoration, which had been pending for some time, were concluded, and a definite contract was entered into with Mr. John H. Lafarge, by which he not only undertook to design and execute the work, but made himself responsible for the whole expenditure, purchasing the colors, employing all the artists from the family of distinguished painters who assisted him in his own special work, down to the little boy of all work, who ran the wheels and stirred the barrels of color. This responsibility, formidable as it must seem to a professional man usually engaged in business affairs, was undertaken by Mr. H. A. Flagg. It is this to say, much less than any hope of pecuniary profit, which he had little reason to expect, than from a true artistic enthusiasm for a work so novel, and affording such an opportunity for the highest exercise of a painter's talents, and the work, as undertaken, was executed with great self-devotion to a most successful completion.

After the preliminary arrangements were made, Mr. Laffage, perfecting the arrangements and thoroughness of the work to his own personal interest, decided to print all the former part of the decoration, including if possible the figures, with encaustic medium, consisting if necessary with vegetable, animal, and mineral substances, in certain proportions, instead of mixing the colors with an ordinary oil-scarper medium of water and oil.

The encaustic process is much more costly, but more than the colors produced by the water and oil-scarper. From water flowing over them, which would entirely obliterate a subsequent painting, scarcely affect the encaustic colors.

With the general restriction on the part of the artist, it was necessary to wait for an extension of time allowed by the committee finishing the decoration, and process was the impatience of the public to see possession of their Church, after having been for four years in a manner homeless, the desired extension was finally granted, and at the same time a further appropriation of money was made, particularly for the decoration of the roof, and for the gliding certain portions of the work, changes with the artist though desirable, but which were unincorporated in the original contract. These modifications were carried out, and at least the work, which had excited great interest among the public, was handed over to the Committee.

As soon as the decoration was finished, the scaffolding was removed, and the press and hand furniture, which were all made and ready to go on, were rapidly put in place. Meanwhile the organ was fixed in position and tuned.

About the middle of the forenoon of February 1, 1867, the first festival of the great stage, which had been in gliding nearly two and a half years, was finished at 10, and on the evening of Sunday, February 3, the which had been reserved by the crossing of February 2, everything was in readiness for the Communion, which took place the following day.

Trinity's Latin Cross Design

In plan, the Church as it stands is a Latin cross, with a semicircular apse added to the western end. The arms of the cross are short, in proportion to their width. In general, taking the square at the intersection of nave and transept as a unit, the total length of the modifications is three squares, of which the chancel, including the apse, forms one, the apse at the bottom two another, and the nave a third, the transept being each half a square. Over the square at the intersection stands the tower. The sides would be very narrow for a Gothic Church, but are in diameter for the Romanesque, and are much more serviceable when thus reduced to passage way, than when their width occupies their being occupied by piers. The chancel may be carried by an arcade of two arches only.

The church's upper regions

Above the sides a gallery is carried across the arches, which from its position, was distinguished by the name of the 'volunteer' gallery, and across a passage to connect the two main galleries, one across either transept, and one across the west end of the nave, over the vestibule. Both the west gallery and the two triforium galleries connect with the choir aisle which occupy the

various towers, and the tower galleries can also reached by spiral staircases, ascending over from a north-western vestibule, which serves as entrance both from the exterior. A more directly and from the interior communicating with the Chapel, and the other from a south-western vestibule entered from St. James' tower. The ceiling opens upon the north-east vestibule, as well as the main western vestibule is 52 feet long, the width of the nave, without counting the lower story of the western tower, which virtually the organ of it, and increases in length on approach of the choir. In the middle of the westwork is the main portal, and a secondary door opens into each of the towers, giving thus three entrances to the nave from, and five double doors open from the western vestibule into the Church.

The upper regions of the Church are reached by a winding stair in the north-western corner of the great tower, starting from the tower over the north-east vestibule. This leads to the bell-chamber over the transept which opens the tower to the Church. The whole interior of the Church and Chapel is finished in black and white, and all the vestibules in oak and oak.

Style and antecedents

The style of the Church may be characterized as a more modern of the French Renaissance, including particularly in the wheel that finished in the sixteenth century in Central France - the ancient Aquitaine - which, more politically, on the one hand from the Norman power, and on the other from the Spanish invasions, as well as architecturally emancipated from the influence of the classic conditions and examples which still ruled the southern provinces, developed its various forms a system of architecture of its own, differing from the classic of manner in that, while it made it elegant, it was also conventional, and from the so-called Gothic, in that, although conventional, it could neither something of mechanical derivation for the sake of grandeur and repose.

Among the features of the Renaissance of Central France, nowhere were the peculiar characteristics of the style so strongly marked as in the powerful, enlightened and cultured cities of Anjou. The central tower, a masterpiece, perhaps, of the genius of Victor and Constantino, was here fully developed, so that in many cases the tower became, as it were, the Church, and the congregation took the outline of a pyramid, the open, airy, airy, and well-shaped forming only the base in the sketch of the tower.

Advantages of the central tower

In analyzing the problem, particularly a building housing on three stories, it appeared desirable that the tower should be central, thus belonging equally to each floor, rather than putting it on any corner, where, from at least one side, it would be nearly out of sight, and in carrying out this system, it was plain that with the ordinary proportions of Church and tower, either the tower must be comparatively small, with result being its supporting piers inconveniently in the side of the congregation, or the tower being large, the use of the Church must be sacrificed to inadequate proportions.

For this dilemma the strongest solution seemed probably adopted, instead of the tower being an inconvenient and unnecessary addition to the church, from itself made the main feature. The

struggle for precedence, which often takes place between a Church and its spire, was disposed of, by at once and completely subordinating tower, tracery, and spire, and grouping them about the tower as the central mass.

The two great figures on the western facade, the details of sculpture upon the tracery work, and the tracery of the doors and windows, will remain unaltered, and must be left for the future. But the distinguishing characteristics of a style are independent of details; especially so in the case of the Romanesque, which in its treatment of masses, affords an inexhaustible source of study quite independent of its details as a school of sculpture.

Church Dimensions

Table 1: Church Dimensions

Description	Feet	Inches
Exterior width across tracery to outside of walls	120	00
Width of nave floor	91	00
Width of nave floor across to centers of piers of arcade	83	00
Width of aisle, from the inside of walls to an edge of pier of arcade	9	4
Exterior length of Church, outside	179	01
Depth of chancel	37	0
Width of chancel, inside the walls	32	3
Width of tracery	31	00
Interior diam. of tower	36 ft. inside side	
Height of great pier from base to spring of arches	76	3
Height from base to upper point of nave ceiling	63	3
Height from base to ceiling of tower	60	3
Height of exterior walls from ground to cornice	48	0
Height from ground to center of tower	121	3
Height from ground to highest corner including	149	3
Height from ground to highest point of spire	211	3