The Pasadena Institute of Technology—known as Caltech—is one of the most prominent science and technology universities in the world. Its campus provides a unique window into the history of California architecture and urbanism.

Caltech Before Goodhue

Caltech was launched in 1908 through a master plan for what was then the Throop Polytechnic Institute by the local architectural firm of Hunt and Grey (fig. 2). Initial suggestions by Elmer Grey for the foundation architecture of the campus reflected a classicism inspired by the local presence of the Hispanic fabricas, the great California civic and ecclesiastical buildings of the nineteenth century (fig. 3). This Mission Revival was constrained by a fragmentary approach to design that limited a comprehensive understanding of the orders, and distorted their canonical definition and application. The firm’s first building on campus, the domed Throop Hall of 1910, later renamed Pasadena Hall and now demolished, is a clear illustration of this rather provincial approach (fig. 5).

In 1910, the two architects dissolved their partnership and set up separate local offices. Myron Hunt continued with Throop Polytechnic as a client. The inspiration for all of Hunt’s campus planning projects was the iconic 1816 Thomas Jefferson campus design for the University of Virginia. In his definitive 1912 master plan for Caltech, and in a later project for Pomona College, most campus buildings were arrayed perpendicularly and symmetrically off and along a central axis to define grand quadrangles of various sizes and shapes. Repeating buildings were stitched together by arcades, and unique structures terminated the quads. The imprint of the University of Virginia model guided the foundation design and construction of these campuses, in both the arrangement of their buildings and open spaces. It has long since been abandoned.

Bertram Goodhue at Caltech

The architects responsible for the transformation of the Caltech campus from 1915 to 1936 were the New York–based Bertram Goodhue and his associates. Goodhue inherited the provincial campus plan of Myron Hunt, and transformed it into a distinguished ensemble of academic buildings, for what proved to be perhaps the most important scientific and technical learning center in our country. Goodhue was one of the most prominent and celebrated American architects in the first two decades of the twenti-

The Goodhue oeuvre at Caltech is the most resolved and refined among buildings produced in Southern California during the first half of the twentieth century.

Fig. 1. Aerial perspective of proposed campus for the California Institute of Technology (Caltech), Pasadena, California, by Bertram Goodhue, 1916. View from the west looking east.
in Southern California, he encouraged many architecture students to travel to both Spain and Mexico to study classical and vernacular Hispanic architecture in its urban and rural settings, and to photograph, measure, and draw elements of its key residential fabric as well as its civic and ecclesiastical monuments. Goodhue wrote introductions to some of the folios that were authored and published by these students upon their return to the United States, among them Austin Whittlesey’s *The Minor Ecclesiastical, Domestic and Garden Architecture of Southern Spain* (1917). By the end of the 1920s, these published folios numbered in the dozens and today constitute one of the deepest sources of accurately documented Hispanic architecture in both Europe and the Americas.

Goodhue put these new drawings and photographs to immediate use. On the residential front, his Dater House in Montecito of 1915–18 and the Coppell House in Pasadena of 1916 (fig. 5) were the first genuinely “Hispanic fusion” buildings to be ever designed in Southern California. Their composition, materiality, choice of architectural elements, scale, and proportion were skillful interpretations of ideas first glimpsed in the documentary folios of his students. The influence of these two houses on the residential architecture of Southern California in the decades that followed was extraordinary. An entire generation of talented architects was inspired to follow in Goodhue’s wake and produced spectacular buildings and places of their own. On the civic front, Goodhue’s buildings and grounds for the 1915 San Diego Panama–California Pacific Exposition, including the California Building, the Casa de Balboa, the Casa del Prado, and many more, were projects that could only be designed by precise reference to architectural precedents, well measured and well documented in detailed drawings (fig. 6). They consolidated the idea that the mixed Mediterranean, Anglo-American, Spanish, and Mexican cultural foundation of California deserved an architecture to celebrate it that was authentically Latin in its derivation and essence.

It did not take long for Goodhue’s approach to classicism and the architect’s remarkable built work in Southern California to come to the attention of George Ellery Hale at Caltech. Hale was renowned as an astronomer, a Pasadena booster, and an ardent in his own right. He had been instrumental in transforming Throop Polytechnic into Caltech, a national institution for engineering, scientific research, and education.

In 1915, Goodhue was invited by Hale to visit Caltech to consult on the design of the Gates Laboratory of Chemistry, then being designed by Myron Hunt. The Pasadena architect was well acquainted with Goodhue; as Hunt & Grey had served as executive architect of his first major commission in California, the James Waldron Gillopie House (“El Fureidis”) in Montecito, of 1908. The sketch that Goodhue produced for the Gates Laboratory building was loosely modeled on the urban Renaissance palaces of central Spain. His choice of the flexible laboratory loft, and the building’s monumental scale, with its highly ornamented central doorway and the serial composition of its ornate double windows, must have seemed extraordinary to Hale as illustrations of the potential for a new California classicism (fig. 7)—particularly when compared to the previous provincial and timid building proposals by Hunt for the same building. Under pressure, the local architect eventually acknowledged the superiority of the Goodhue design and ceded the commission to him. Myron Hunt was not engaged by Caltech ever again.

In 1916, Goodhue proceeded to propose an extraordinary campus plan (fig. 8). It generally followed the Jeffersonian principles of the Hunt master plan, but it adjusted most of its building and open space features—all for the better. The plan’s figurative space was anchored by a large, 180-by-180-foot central quad, modeled on the...
Mission San Juan Capistrano. This quad was bisected by a north-south axis that provided a formal entrance to the campus from the south. On the west side of the campus, an elegant long space inspired by the Persian gardens that Goodhue had observed and documented during his visit to Iran with James Waddon Gillespie in 1906, framed a formal entrance from the city of Pasadena into Caltech. This expanse was terminated by a domed library, the most monumental building on the campus, never built. On the east side, a large quadrangle completed the campus, enclosed on all sides by residence halls. Goodhue’s perspective drawing of this east-west sequence of campus quads is the most synoptic and poetic description of the architect’s intentions for the overall form of the Caltech campus. (see fig. 1).

Departmental buildings were placed perpendicular to the campus edge and were generously set back and spaced apart, to minimize their effect on the surrounding neighborhood. Principal buildings such as the library and the Hunt and Grey-designed Pasadena Hall were situated perpendicular to the east-west axis, to define the three distinct campus quads. The referential nature of the main open space and landscape design for the campus, the flexible design of the lab buildings, and the formality and prominence of the most important campus buildings rendered in a novel Hispanic fusion form, must have deeply impressed the school’s leadership. Before his untimely death in 1924, Goodhue was further entrusted with a large number of additional commissions at Caltech. Gates Laboratory was followed by Culbertson Hall of 1922 (demolished in the 1970s); the Norman Bridge Laboratory of Physics of 1922, 1923, and 1925; the High Voltage Research Laboratory of 1923; and the Dabney Hall of the Humanities, completed in 1928 after the architect’s death by Goodhue Associates, the immediate successor firm. Between 1929 and 1939, the entire ensemble of extraordinary buildings surrounding the western linear quad, which included Arms, Kerckhoff, and Mudd Halls, was designed by Mayers, Murray & Philll, the New York firm into which Goodhue Associates had morphed by that time. What is unique and unusual about this last set of projects is that the design was carried out in different phases, and while they were separately constructed, they were designed and eventually realized in a singular, interconnected, and coordinated architectural form. This final post-Wall Street crash building spurt also included the most notable classical building on the campus, the Henry M. Robinson Laboratory of Astrophysics completed in 1932.

From an architectural and urbanist perspective, the Goodhue oeuvre at Caltech is the most resolved and refined among buildings produced in Southern California during the first half of the twentieth century, the period of this region’s institutional and territorial consolidation. Under Goodhue’s direct influence, the firm’s architecture evolved from a strict and literal application of the then recently documented Hispanic orders and ornament to an increasingly eclectic use of both European and American Colonial elements more freely composed, and finally, into a more abstract and exotic expression, representing the openness, demographic diversity, social mobility, and entrepreneurship of an emerging California culture. This formal evolution can be traced and its lessons easily absorbed, because most of the nine Goodhue building designs were cast on a common, stable, base-form, a building chassis that included several key design dimensions.

**Emplacement**
Caltech was founded as a distinctive scientific institution with a novel pedagogical approach. Its students were to be educated through direct involvement in experiment-based research, conducted in collaboration with their faculty. For that reason, most of the buildings designed by Goodhue were laboratories. In his 1916 master plan, these...
labs were placed on the northern and southern long edges of the campus and perpendicular to its principal east-west axis and the thoroughfares bounding it. The laboratory buildings were of all of a similar size and configured in a rectangular plan. They had frontal and central entrances on the sides facing the main campus quadrangle, and defined small quadrangles, courtyards, or open gardens on their rear sides. They were connected on their short ends around the main campus quadrangle with arcades.

**Architectural Plan**

Goodhue’s laboratory buildings at Caltech were organized as two distinct plan zones. At the center of each floor was a wide, architecturally elaborate corridor, intended to be of permanent form. The plan perimeter, against the exterior walls, was divided into various rooms, classrooms, offices, and labs. The labs were designed as flexible, changeable space, finished according to the evolving experimental requirements of each faculty-student team. Amazingly, this kind of spatial organization for one of the world’s premier scientific institutions has remained valid for more than one hundred years, despite constant remodeling.

**Architectural Section and Elevation**

The plan parts of the laboratories, and their intended flexibility of use, heavily influenced their internal spatial organization as well. They were designed as open lofts with building sections featuring a common floor to floor height. As a consequence of the dimensional similarity among the various lab buildings in plan and section, they shared dimensionally identical elevational planes, on their short and long sides. Their resulting common massing rendered the Goodhue buildings subject to using identical structural, mechanical, electrical, and plumbing systems, which along with similarly scaled doors and windows, entrance points, and shared ornamentation opportunities, underlined the formal affinity among them.

**Construction, Materials, and Finishes**

The constructional and systems technologies used in the laboratories were also advanced for their time. Buildings were produced in reinforced concrete frames with unreinforced terra-cotta tile as infill and cast stone and plaster as exterior finishes. Their electrical, mechanical, and plumbing systems were exposed within the experimental lofts. The highly detailed ornament was also produced in cast stone. Although the buildings have been modified scores of times since, this has not substantially affected their overall form or its details.

**Rhythm and Scale**

Each laboratory space required doors and windows of relatively similar size. Although these were often sized differently from building to building, within individual designs, they were vertically proportioned, and also vertically aligned and horizontally repeated in a steady serial rhythm. In direct response to the architecture of Hispanic precedents in Spain and Mexico, buildings were accessed through a monumental stair and stoop, and entered through a heavily ornamented front door located in the center of their long sides. Buildings were often folded for their entire height at their corners, as a way of boosting their figural presence and, as a result, their scale.

**Ornamentation**

The ornamentation strategy for all the buildings focused on five features typical of the Hispanic classical tradition. These were the articulation of their mass into base, body, and top; complex framing around windows; the use of the orders to celebrate principal entrances; the embellishment of large wall panels; and the articulation of building corners.

Over the course of twenty-three years, and based on these elements, Goodhue and his associates designed all of their work at Caltech as an ensemble, a family of identifiable common forms. The buildings were located adjacent to one another, and for a quarter century, and from building to building, their physiognomy would keep transforming—from literal historicism to a lighter referential classicism, and finally to a nascent modernism rooted in urbanism, historical precedence, and cultural accommodation.

The first of their buildings, the Gates Laboratory of Chemistry (now the Parsons–Gates Hall of Administration), had a dual point of departure (fig. 9). In its overall massing and composition, it was inspired by Spanish palaces of the Renaissance, while in its details it recalled the exuberant hybrid classical orders and ornamental excess of the Mexican Baroque. Goodhue’s rendering of Gates Hall stunned the professorial elite at Caltech because its design was erudite. It exuded pure academic audacity, as it was based on the tangible evidence of a Hispanic classicalism both American and European, and was composed to specifically address the search for a new cultural identity for the American Southwest. Yet, the classicism of Gates

---

Fig. 10. Norman Bridge Laboratory of Physics, Caltech, designed by Bertram Goodhue, 1922.
was not radical enough for Goodhue. The building seemed hemmed in by a literal connection to its precedents, its architecture too narrowly derivative and, therefore, not the ultimate fit to accommodate and represent an emerging American scientific institution of the first order.

The buildings that followed, the Norman Bridge Laboratory of Physics of 1922 (fig. 10) and the High-Voltage Research Laboratory of 1923, were intentionally simpler. Goodhue was focused on generating an architecture that was novel, emotionally engaging, and even fashionable, at the same time being of a particular kind of classicism suited to Southern California. But what could the means be for conceptualizing such an architecture?

The climate suggested that one could build more lightly here, while challenging the dividing line between indoors and outdoors. The sharp Mediterranean light of Pasadena could lead to a reduction in the depth of all ornamentation and a simplification of its profiles, as well as a shift in building coloration from gray to sand tones. Heat gain could be controlled with smaller windows, which could be thinner and lighter, as they would now be made of steel. Concrete construction could allow the design of a more malleable, monochrome body, extended across a variety of materials including plaster, stone, and precast concrete. This is a building designed at the cusp of a fully referential and a freer expression.

While they are still the laboratory buildings envisioned in the Caltech master plan of 1916, their form is driven by their unique program—Dabney extending horizontally around one of the finest gardens designed by Beatrix Farrand, while Robinson is organized around the vertical axis of a spectroheliograph that stretches from its sub-basement to its dome. In both buildings, the detailing is playful and original, yet still fully identifiable within the Hispanic tradition.

At Dabney (fig. 11), the body of the building emerges as a pure form finished in plaster, devoid of any moldings and cornices wrapping it, while still well defined in the round. The building's classical details are limited to a dramatically scaled main entrance, of a discernibly Mexican, pre-Hispanic design, but without any overt references to the four canonical, classical orders, or their idiomatic colonial progeny. There is also a double iron balcony on the courtyard side, attached to a fountain to generate a new kind of frontage, its components Mesoamerican in form yet transformed into a new ensemble. Exemplifying the extreme end of freer expression, the building's north doorway is reduced to a framed door, the wall behind it stripped of all ornamentation and replaced by a shower of confetti, expressed as a field of colored tiles. The building's simplicity of basic form and sparsity of detail is in tension between the intense plasticity of a Southwestern Anasazi Pueblo and the flatness of Machine Age architecture. In this extraordinary project, Goodhue so commands the design traditions he is operating under that he is able to absorb them and deliver through them a thoroughly unfamiliar and deeply personal architecture.

At Robinson (fig. 12), the architecture never strays far beyond the familiar, but the freedom and exuberance with which it is conveyed are notable. The building's body is rendered as smooth as possible and its ornamentation is limited to the few places where it is needed to express a sense of public purpose—for example, in the marking of the location of the library and the front door, or the placement of the emblematic relief of the sun in front of the dome. The omission of some canonical elements of classical design, such as window frames, headers, and sills, is notable, as is the building's sand-colored, monochrome body, extended across a variety of materials including plaster, stone, and precast concrete. This is a building designed at the cusp of a fully referential and a freer expression.

In the next and last phase of the work of Goodhue and his two successor firms at Caltech, the process of idiosyncratic design was accelerated and led to the design of two final masterpieces: the Dabney Hall of the Humanities and the Henry M. Robinson Hall of Astrophysics. These are mature designs whose architecture is both unique and fully integrated into the campus. The body culture of the region and its reverence for the simple elegance of the human figure, then being revealed, may have inspired the increasingly simple massing and gradual reduction in ornamentation of this new set of buildings. Their iconography remained one of Hispanic fusion, but their abstracted integrations of American and European Hispanic features was becoming more evident and dominant as the original references began to recede. Digested through the filter of a brilliant traditionalist architect, the result was a classicism that blazed a relatively unfamiliar and prophetic route into engaging compositional tableaus. Goodhue followed through on all of these ideas and more.

The climate suggested that one could build more lightly here, while challenging the dividing line between indoors and outdoors. The sharp Mediterranean light of Pasadena could lead to a reduction in the depth of all ornamentation and a simplification of its profiles, as well as a shift in building coloration from gray to sand tones. Heat gain could be controlled with smaller windows, which could be thinner and lighter, as they would now be made of steel. Concrete construction could allow the design of a more malleable, monochrome body, extended across a variety of materials including plaster, stone, and precast concrete. This is a building designed at the cusp of a fully referential and a freer expression.
Bertram Goodhue and a California Classicism of Its Place and Time

Goodhue’s work at Caltech challenges the current impulse of traditionalists to remain constrained by strictly normative and referential design. It advances the prospect that the mastery of the classical language, the control of the means of its construction, and its artful insertion into particular urban settings, climates, and cultures can lead to novel results—as seen in an architecture that is freer, more inventive, and more relevant in linking what we have known through the ages to that which remains yet to be discovered.

The nine Caltech campus buildings by Goodhue, his associates, and successor firms, constitute one of the finest illustrations of twentieth-century placemaking, built according to a regionalist classical architectural aesthetic. They are also a unique contribution to the ongoing debate about the prospect of projecting many regional classicisms that can be an expression of both their time and of their place (fig. 13).

For an architecture to be of its place, it needs to embody some key formal dimensions. It must play a part in the incremental physical construction of the city, and its program must be tailored to the society it serves. In this architectural ideal, its types are adapted to the climate of its region, its form leverages the public realm, its symbolism reflects the nature of the culture that sponsors it and uses it, and its longevity is secured by durable materials and construction.

For the same architecture to also be of its time, it needs to respond to the evolving ethical imperatives that enable and guide the life of the society it is built to support. It must be resource-efficient, not wasteful, labor- not capital-intensive, of benefit to society at large, not just a privileged few. It needs to be flexible and reusable, not disposable. Both conserving of received knowledge and innovative, such an architecture must be nuanced in its application across a wide range of urban and rural contexts, rather than diagrammatic and stereotypical.

In the current state of a resurgent classicism, it is important that we traditionalists not focus solely on reinventing a singular American classical and vernacular culture but also that we rediscover the many regional design traditions that were triumphant before the crash of 1929 and which are such vital examples of a living and evolving traditional architecture and urbanism. By learning from these rich projects and practices, and by then operating in their spirit, we can work to secure beautiful, civilized, and sustainable built environments everywhere and for all. Both the inspiration and the process of design and construction that can be divined from Bertram Goodhue’s work at Caltech provide a valuable and time-tested path for today’s Southern California architecture to follow.

Stefanos Polyzoides was born and educated in Athens, Greece, and earned a B.A. and an M.Arch degree in Architecture and Planning from Princeton University. His career has engaged a broad span of architecture and urbanism, its history, theory, education, and design. He is a co-founder of the Congress for the New Urbanism and, with his wife, Elizabeth Moule, a partner in Moule & Polyzoides, the Pasadena, California-based practice he co-founded in 1990. From 1972 until 1997, he was an Associate Professor of Architecture at the University of Southern California.

Fig. 12. Henry M. Robinson Hall of Astrophysics (now Linde + Robinson Hall for Global Environmental Science), Caltech, designed by Mayers, Murray & Phillip, 1932.

Fig. 13. Aerial view of the Caltech campus, c. 1935.