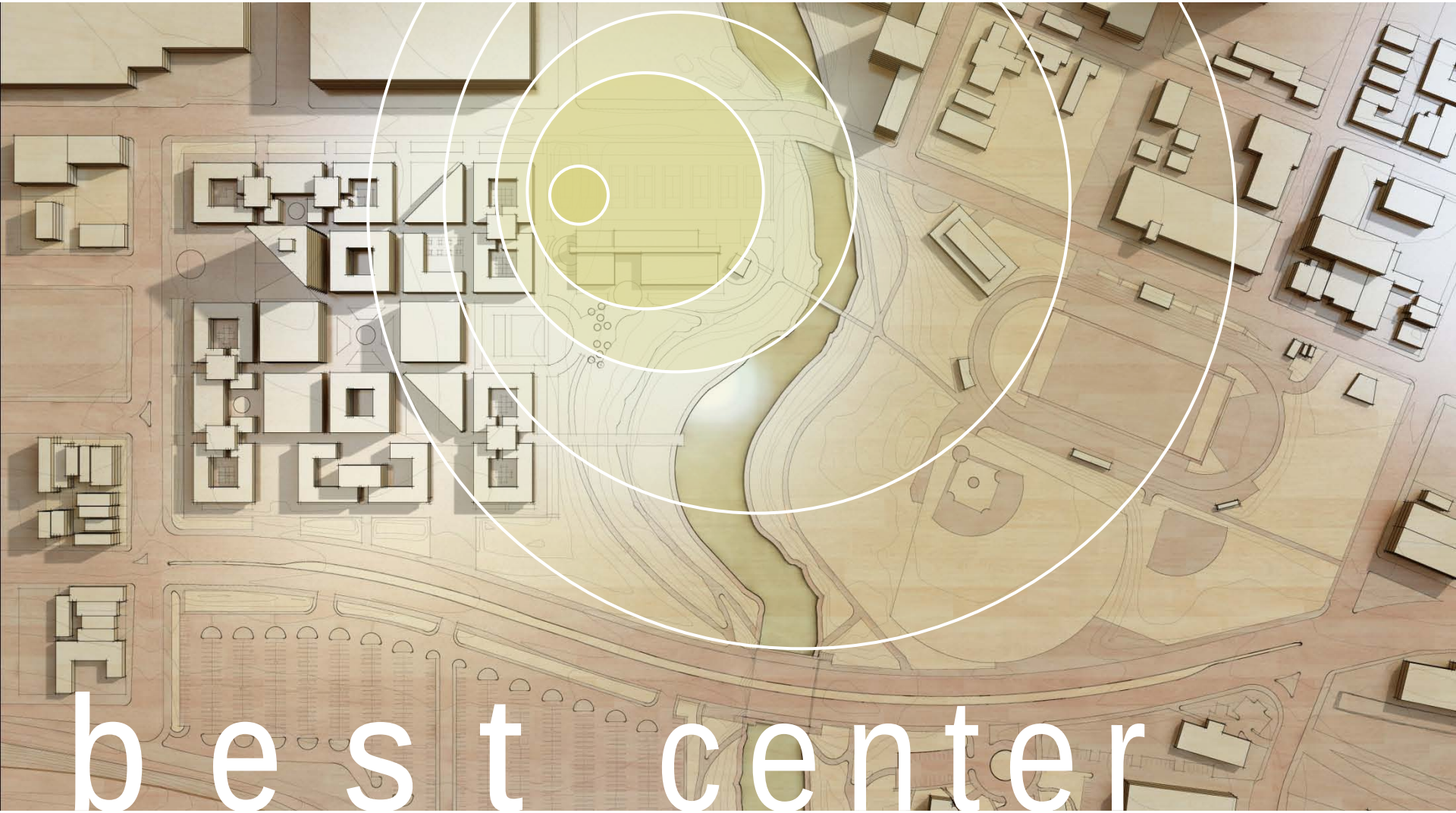


# best center

# purpose: transformative change

## vision

Imagine a new kind of educational space where students…
can access the latest green building, energy efficiency, and solar technologies within a single facility,
transform their classroom into a dynamic, “living laboratory” which reinforces conceptual knowledge with hands-on practice,
develop insights and skills to gain jobs and productive careers in a growing green construction and energy economy,
and can be inspired to collaborate with others and make a difference in their communities and the world.

The Building Efficiency for a Sustainable Tomorrow (BEST) Center at Laney College will demonstrate best practices in the design and construction of Zero Energy buildings, function as a training center for the installation and maintenance of sustainable technologies, and serve as a national model of excellence in high performance building.

## reason

With the need to address global climate issues and to introduce clean energy technologies, there is opportunity to raise public consciousness and to prepare students for entry into a growing green economy. While three National Laboratories and major universities have established the Bay Area is an intellectual center for energy research, these facilities have limited or restricted access, primarily serving researchers and academicians. The local utility, PG&E offers instructional programs through it’s Energy Training Center, however these are not targeted at students seeking certificate or degree programs.

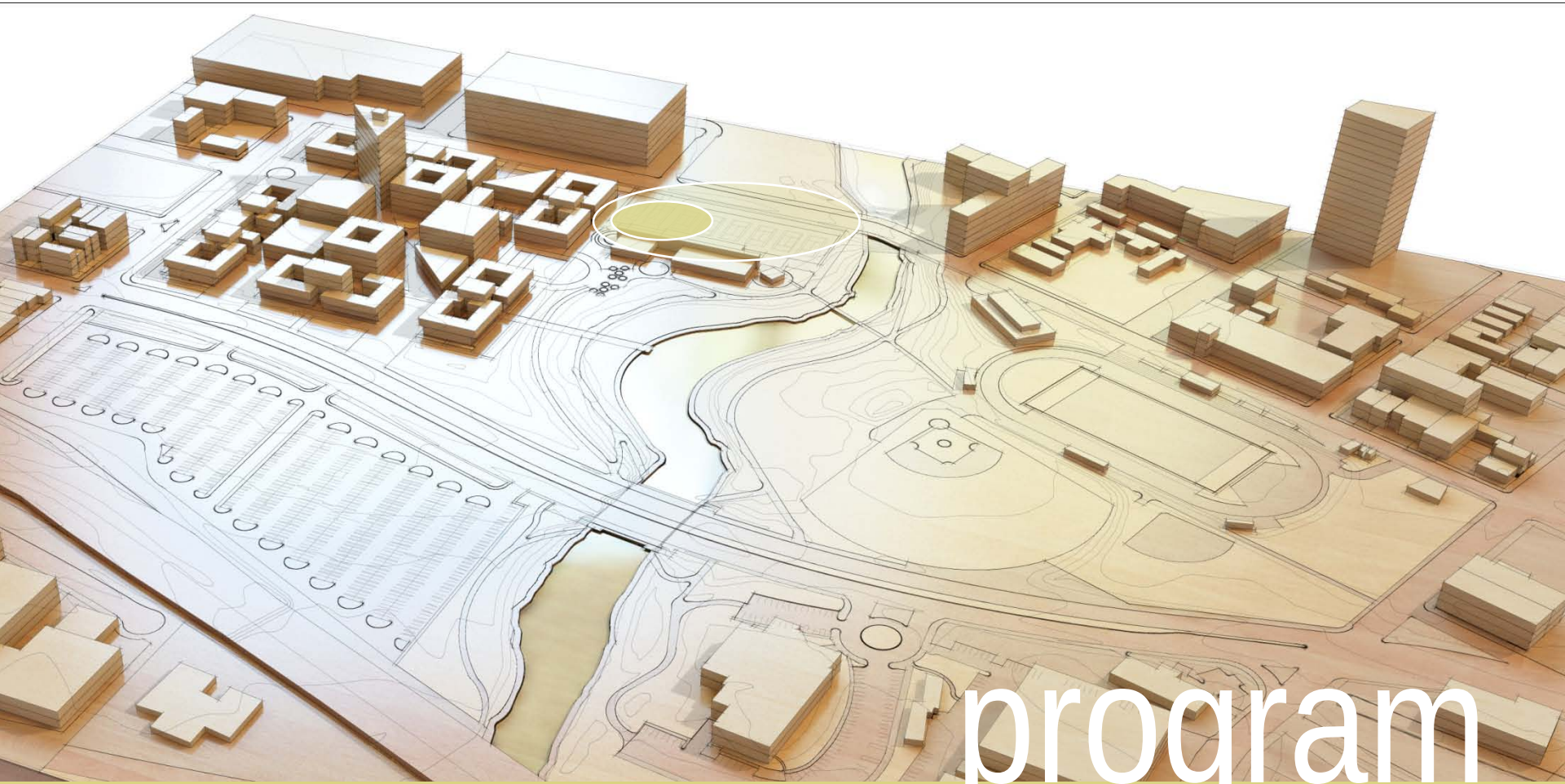
# purpose: transformative change

## recognition

Laney College is well-poised to fill this gap. Laney has long been committed to providing for-credit career and technical education for the construction industry and allied professions. Emphasis on hands-on learning is a hallmark of these programs. In addition, the College has steadily increased its focus on green jobs training, energy efficiency, and high-performance environmental control technology. This proficiency has been recognized by economic support from the National Science Foundation (NSF), private and state green workforce development grants, and funding from the American Reinvestment and Recovery Act (ARRA).

## mission

The State of California will mandate Zero Energy technology for all new commercial buildings by the year 2030. "Zero energy" means that the amount of energy produced on-site by renewable sources equals the amount of energy consumed by a building. The construction of a Zero Energy training center is Laney College's opportunity to lead by example. Laney will foster the next generation of building designers and technicians by training them in a learning environment that exhibits the best practices of the high performance building industry. This will be a center of excellence that sets the trend for California higher education and provides a transformative vision for construction practices in the United States.



# program

# program: site development

## sustainable site

The BEST Center is proposed for the western end of the college tennis courts along East 10th Street. This location is adjacent to the current instructional and training areas for the college's Building Performance Institute and associated construction programs. This favorable proximity does however displace current site uses. Initial construction will occupy the space of two tennis courts, ultimately expanding to cover more of the court area.

The site enjoys favorable solar orientation and affords good access for both service and public uses. In order to meet specific sustainable performance requirements, some portions of the site must be assigned to outdoor uses, including stormwater storage and treatment and landscape coverage, and may ultimately include urban agriculture. Consistent with the Center's mission, these elements will feature both as public educational exhibits and as academic training opportunities.

The Center's buildings themselves support three pedagogical opportunities, reflected in the specific qualities of three distinct structures. These include two conjoined "Test Houses"- transformable structures to support practical training for sustainable construction techniques. The "Passiv Classroom ", constructed adjacent is intended to meet "Passivhaus" criteria. It will illustrate specific energy-conserving principles of that system and general characteristics for high-performance building. Recognizing criteria for zero-net energy, the "Sustainable Building Center" will assume the ambitious environmental standards of the "Living Building Challenge" as a project goal. Requirements for these buildings and standards are described in the pages that follow.

# program: test houses 1 and 2

## test house1

Test House 1 is a 1250 square foot structure for Building Performance Testing. Permanent features of the building include utility connections and a structural timber frame, capable of receiving the cladding materials and conditioning systems that might be found in “typical” commercial or residential structures in the area. By design, these components will reflect the problematic conditions that may be found in many existing structures. By intent, initial construction and any subsequent changes will be undertaken by students. This is perhaps best appreciated as a piece of instructional technology, rather than a permanent building. Requirements for code conformance and the relationship to third-party certification will be confirmed in the design phase.

## test house2

Test House 2 is a1250 square foot structure, constructed to demonstrate Building Construction and Systems. Constructed conditions include a weather-tight shell. very high performance building envelope in order to more accurately gauge performance of mechanical equipment. Test House 2 is intended to serve for an extended time as a test bed for mechanical devices. To achieve this, the envelope may approach the thermal conditioning standards of the “Passivhaus” program, described in the section that follows. The need to minimize thermal transmission through walls will be confirmed in the design phase, with perfromance coordinated to meet the requirements of the department’s testing program.

# program: passiv classroom

## passiv classroom

The third component, a 2500 square foot  multi-purpose/exhibit hall will provide additional classroom and meeting space for several departments. This component is intended to follow the guidelines of the “Passivhaus" system.  An ambitious approach to sustainable design, this system employs rigorous construction standards, with very specific requirements for energy performance and material selection. This building is intended as well, to illustrate various aspects of sustainable design and to demonstrate specific technologies that contribute to the instructional program.

## approach

The Test Houses will be designed and constructed in a collaborative process between the departments of Carpentry, Environmental Controls Technology, Architecture, Electricity and Electronics, and Construction Management.  This project will serve as an interdisciplinary design/build project and provide an experiential process for students. Once completed, the Center will serve as an ongoing test labs for energy efficiency, electrical, HVAC, and solar installation courses. Over time, students will also have the opportunity to renovate the buildings through modifications and upgrades of different building systems.

The project benefits as well from potential partnerships with investors, the local utility’s zero-net energy program, and the talent and expertise of an engaged community., committed to sustainable development.

# program: full build-out

## the sustainable building center

Second phase construction will introduce the 30,000 square foot “Sustainable Building Center”. This structure will enable the College to enhance current grant-funded activity and to demonstrate commitment to the recent $3.5M grant application to the National Science Foundation. Construction is intended to follow the guidelines of the “Living Building Challenge”. Regarded as the most ambitious approach to sustainable design, this system employs rigorous site development standards, establishes net-zero requirements for water and energy and relates material selection to human health as well as environmental quality. Specific program components include:

- Virtual / technology library and resource center.
- (4) 4,000 asf labs: clean room, computer lab, control center and lighting test lab)
- (8) Classrooms accommodating 25-30 students each.
- Event space to accommodate up to 200 people.
- (3) Twenty-person meeting rooms
- Exterior Gathering Area/ Active Roof with landscape and demonstration systems

# performance

# performance: policy and progress

The Peralta Community College District recognizes what has been called the “Triple Bottom Line” of sustainability- Economy, Equity and Environment- placing physical development in social and economic context. While those factors have informed project goals, achieving a high level of energy conservation and environmental contribution remains most directly applicable to the design process.

Based on the District policy, sustainable performance is assessed by third-party certification. The US Green Building Council’s “Leadership in Energy and Environmental Design” (LEED®) system is used for this evaluation. Now well-established as a standard measure of sustainable design performance, LEED offers a comprehensive means to address energy and environmental issues. This systems has been successfully applied to projects with the District.

Two additional standards have been considered by this study: Passivhaus requirements, to elevate residential construction practices; and the Living Building Challenge, perhaps the most rigorous application of sustainable principles in design and construction. While LEED certification has been broadly adopted for local construction, these new practices are less generally familiar. All three systems are briefly described in the pages that follow.

Ohlone Newark Center: first LEED Platinum campus

Swiss Apartments: 2010 Passivhaus Award

Omega Center - Living Building Challenge

# performance: LEED® certification

Based on the District policy, sustainable performance for new construction is assessed by certification in the US Green Building Council's "Leadership in Energy and Environmental Design" (LEED®) system. In implementation, LEED provides a structure that encourages collaborative contribution, presents a concise framework for decision-making, and relies on third-party evaluation to validate results.

Performance is assessed in five key areas: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources and Indoor Environmental Quality. Overall evaluation includes two additional considerations. Innovation in Design encourages both new strategies and exemplary performance in the basic categories. Adopted with the advent of LEED v3.0, Regional Priority credits recognize critical factors specific to locale.

Performance in these seven categories is graded in a point-rating system. Points or credits are accumulated and achievement is expressed through basic Certification, Silver, Gold and Platinum levels. By policy, all new building projects in the District must qualify for *at least* LEED Silver certification, striving for higher levels where benefits to learning, productivity and operations can be realized. As a zero-net energy building with significant advantages due to program and location, BEST would almost certainly demonstrate a very high-level of achievement in this system.

# performance: passivhaus™

Drawing on exemplary efforts in sustainable construction techniques in many geographic areas, the "Passivhaus" program underscore a basic concept: **buildings designed to operate without traditional "active" heating or cooling systems**. Based on initial success with residential construction in Europe, the system has expanded globally and is now applied to commercial, industrial and public buildings as well as housing.

To certify as a Passivhaus, a building must consume no more than 15 kilowatt-hours of energy per square meter of floor area. This standard applies to *all* energy -- including lights, appliances, entertainment and hot water heating. Thermal comfort is maintained through the use of these general principles:

- good levels of insulation with minimal thermal bridges
- passive solar gains and internal heat sources
- excellent level of air-tightness in the building envelope
- good indoor air quality, provided by a whole-building ventilation system with highly efficient heat recovery

The Passivhaus program maintains a primary focus on energy and is well-suited to address both the project's zero-net goal and the Department's focus on sustainable technologies. Note however that BEST must also meet the general environmental requirements for LEED certification, described on the preceding page and should coordinate with the Living Building Challenge standards, described on the page that follows.

# performance: living building challenge™

The Sustainable Building Center (Phase 2 construction) is intended to adopt of the “Living Building Challenge”. This is a comprehensive approach that …”defines **the most advanced measure of sustainability** in the built environment possible today and acts to diminish the gap between current limits and ideal solutions…[It] is a unified fool for transformative design, allowing us to envision a future that is Socially Just, Culturally Rich and Ecologically Benign”. By addressing sustainability in **social context**, the Challenge may be an effective demonstration of the district’s efforts to advance sustainability standards.

The Challenge is structured to cover seven performance areas, or “Petals”: **Site**, **Water**, **Energy**, **Health**, **Materials**, **Equity** and **Beauty**. The Petals are further defined by twenty “Imperatives” which describe the specific metrics needed to meet performance requirements. These are applied to a wide variety of project types or “Typologies” that recognize differences in occupancy, use, construction type and location but that adhere to the system’s fundamental considerations.

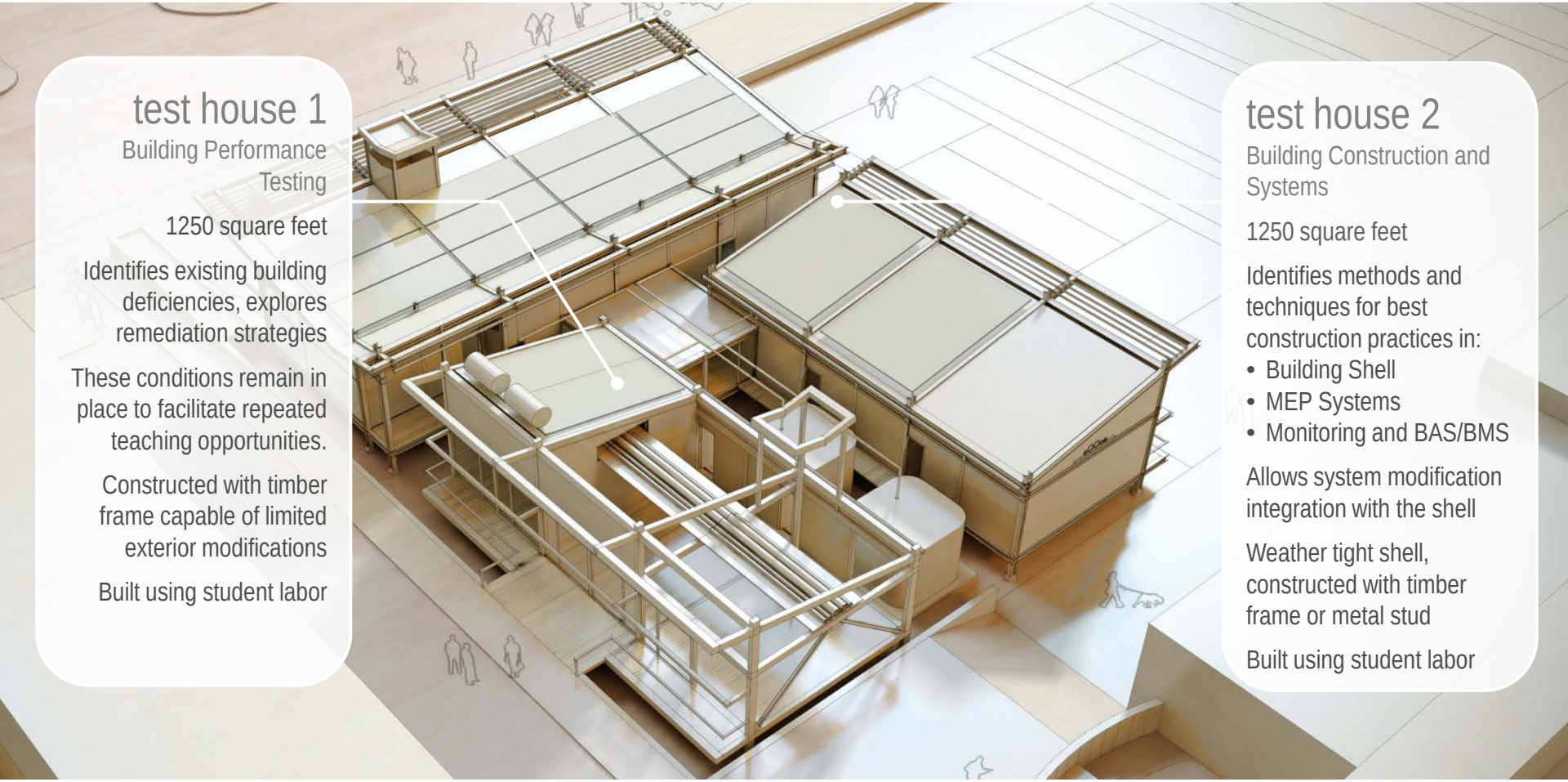
Performance requirements are both more ambitious significantly more rigorous than the certification program previously described. Significant features of the Challenge include

- Zero-net energy performance
- Zero-net water use
- Elimination of materials  that are identified with human health or environmental issues and
- Commitment to develop the building design to both educate and inspire public appreciation of energy and environment.

# place

# place: key plan

# place: aerial view from the southeast



## test house 1

Building Performance Testing

1250 square feet

Identifies existing building deficiencies, explores remediation strategies

These conditions remain in place to facilitate repeated teaching opportunities.

Constructed with timber frame capable of limited exterior modifications

Built using student labor

## test house 2

Building Construction and Systems

1250 square feet

Identifies methods and techniques for best construction practices in:

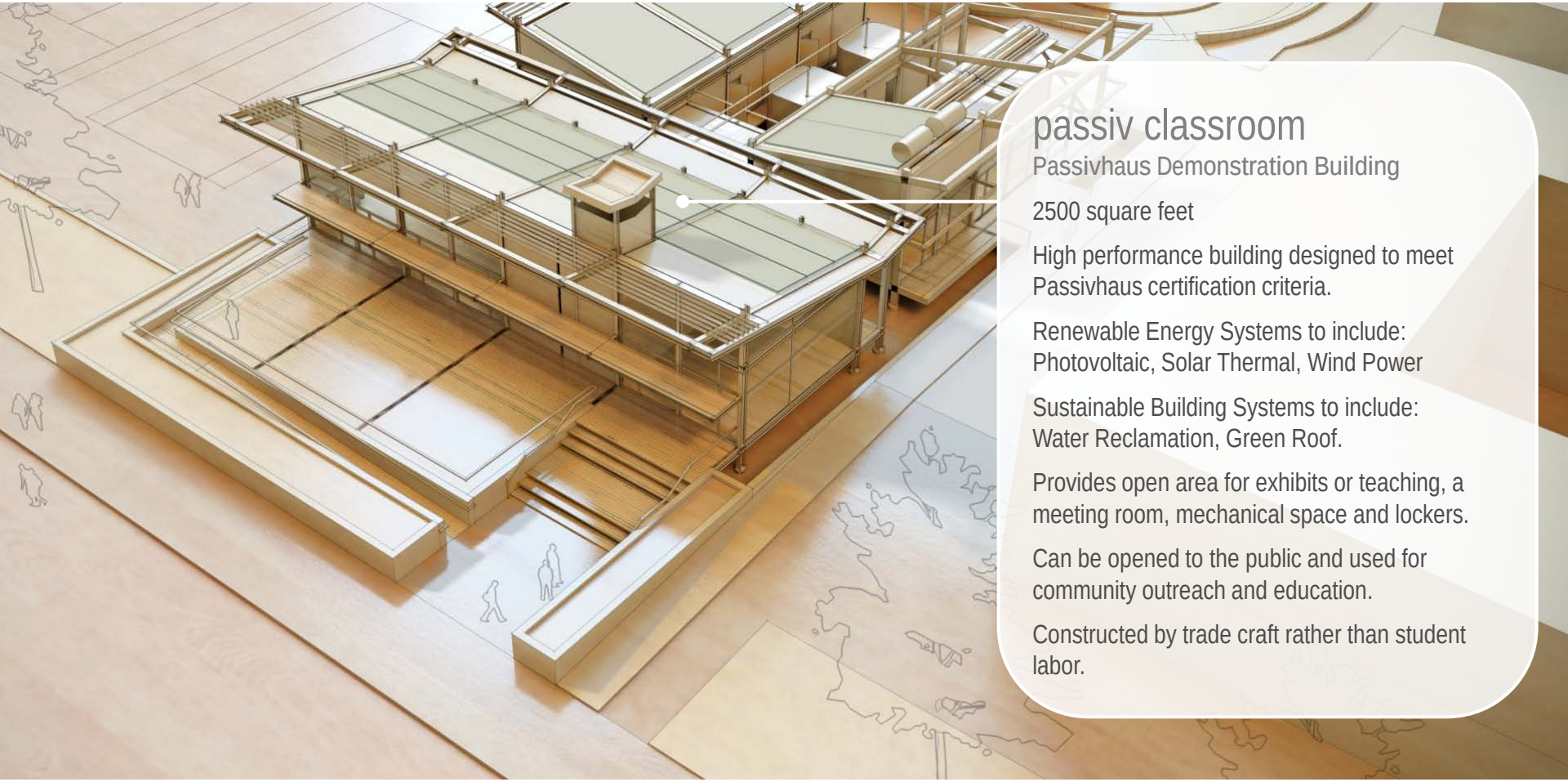
- Building Shell
- MEP Systems
- Monitoring and BAS/BMS

Allows system modification integration with the shell

Weather tight shell, constructed with timber frame or metal stud

Built using student labor

# place: aerial view from the northwest



## passiv classroom

Passivhaus Demonstration Building

2500 square feet

High performance building designed to meet Passivhaus certification criteria.

Renewable Energy Systems to include: Photovoltaic, Solar Thermal, Wind Power

Sustainable Building Systems to include: Water Reclamation, Green Roof.

Provides open area for exhibits or teaching, a meeting room, mechanical space and lockers.

Can be opened to the public and used for community outreach and education.

Constructed by trade craft rather than student labor.

# place: aerial view from the northwest

## sustainable building center

Meeting the Living Building Challenge

30,000 square feet

Enables Laney College to enhance current grant-funded activity and demonstrates commitment to the recent $3.5M grant application to the National Science Foundation. Program spaces include:

Virtual / tech library / resource center.

(4) 4,000 asf labs: clean room, computer lab, control center and lighting test lab)

(8) Classrooms accommodating 25-30 students each.

Event space to accommodate up to 200 people.

(3) 20 person meeting rooms

Exterior Gathering / Active Roof with landscape and demonstration systems

Mechanical/ electrical equipment and devices that exemplify best practices

# place: section through passiv classroom

# place: section through test houses 1 and 2

# place: the passiv classroom from 10th street