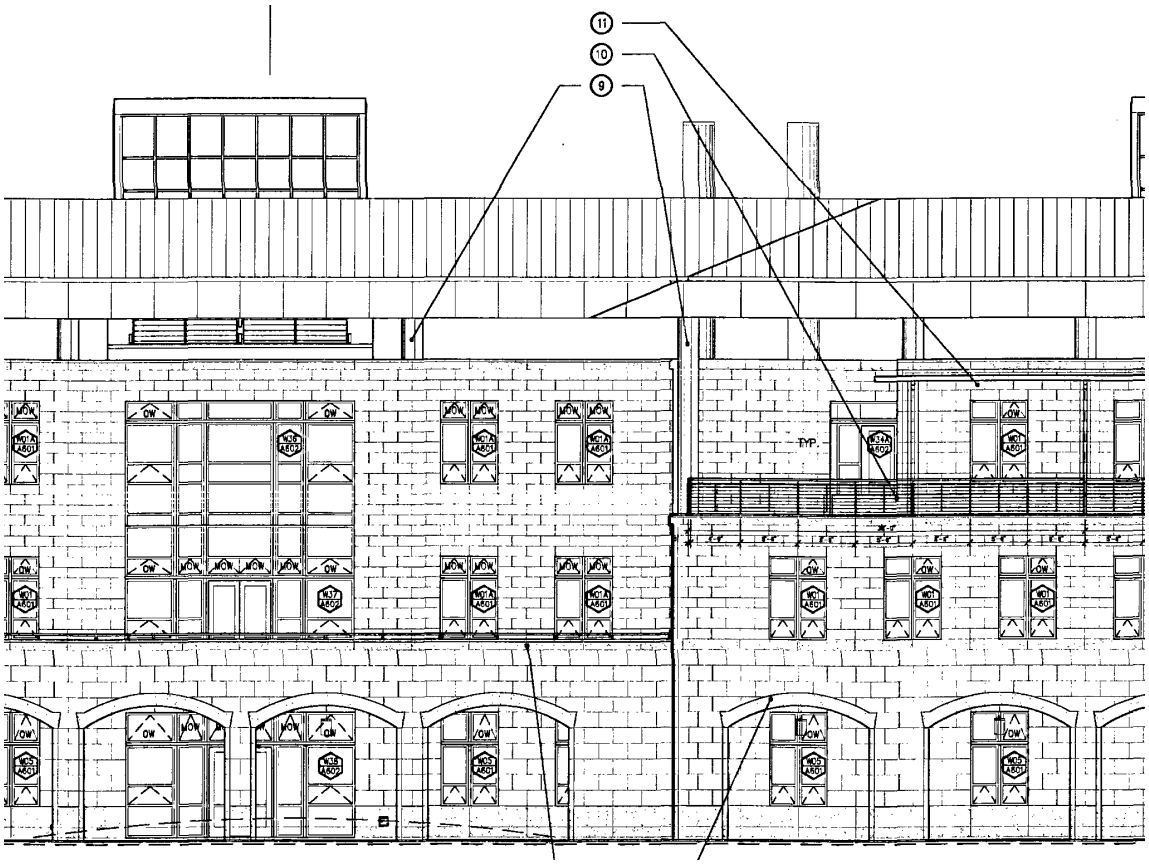
THE PROJECT DELIVERY PROCESS AT STANFORD

STANFORD UNIVERSITY

DEPARTMENT OF PROJECT MANAGEMENT

AUGUST 2010

Version 2.0



Jerry Yang and Akiko Yamazaki Environment + Energy Building

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INTRODUCTION

The Stanford University Project Delivery Process (PDP) manual is a comprehensive overview of the project delivery process and provides a framework that aids in the planning, design, and construction of new projects and renovations.

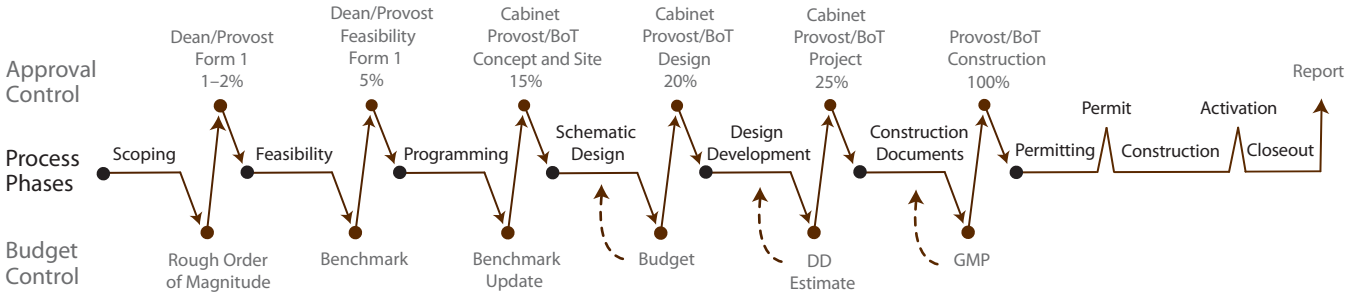
Developed and implemented by the Department of Project Management (DPM), the PDP focuses on collaboration, early program definition, and commitment from the entire team. It emphasizes the use of consistent, rigorous project controls during the entire process to ensure that capital projects support the academic mission of the university and meet approved goals, budgets, and schedules. The PDP will guide project team members to make informed decisions, resulting in improved quality and performance of buildings and reduced risk to the university.

The PDP manual facilitates communication with the stakeholders involved in planning, design, and construction management at Stanford. It clearly identifies the roles and responsibilities of team members, and describes the tasks, deliverables, and approvals that are expected for each of the project phases. Project outcomes benefit from clear expectations and communications throughout the process.

DPM is committed to seeking creative solutions within the framework of informed choices and strives to continuously improve upon the desired outcome.

Success in maintaining project budget and schedule is a result of proper controls during the design process. At the core of the PDP is the "Heartbeat" diagram. The Heartbeat provides the framework for critical control points in relation to project process phases. The Heartbeat divides the design and construction process into process phases, each with its goals, tasks, and deliverables to be completed prior to obtaining the necessary approvals to move forward. Taken together, these tasks, deliverables, and approvals combine to create an organized set of process controls and allow DPM and other university stakeholders to make informed choices throughout the project.

PROJECT HEARTBEAT



ONLINE: PROCESS PHASE RESOURCES

Materials that provide technical information and resources primarily for DPM project managers (PMs) are available online. These resources include checklists of tasks and deliverables for each process phase, detailed project information, and sample documents.

PROJECT TEAM AND COMMUNICATIONS

The PDP manual provides the framework for projects managed by the Department of Project Management. DPM is overseen by the Vice President for Land, Buildings & Real Estate (LBRE). In addition to DPM, LBRE departments include Buildings & Grounds Maintenance (BGM), Sustainability & Energy Management (SEM), Department of Capital Planning and Space Management (DCPSM), Land Use & Environmental Planning (LUEP), University Architect/Campus Planning and Design (UA/CPD), Finance and Administration (F&A), Real Estate, Heritage Services, and Maps & Records.

DEPARTMENT OF PROJECT MANAGEMENT

DPM is comprised of professional project managers, engineers, coordinators, and quality assurance staff who are responsible for the development, design, and construction of major capital projects. DPM reports through LBRE to the President/Provost and Board of Trustees (BoT). The DPM project manager leads the project delivery process, including all phases of design, permitting, construction, occupancy, project budgeting/accounting, and schedules. DPM is tasked with balancing the diverse needs of the university, including program, sustainability, aesthetics, risk, budget, and schedule. Project managers are empowered to make decisions within the framework of process controls/tools described in the PDP and supported by university management.

DPM MISSION

DPM will provide professional leadership to plan and develop high-value, quality, long-term cost-effective facilities and landscapes that enhance the academic mission of the university, embrace our partnership with our community, and reinforce our stewardship of Stanford lands. To that end, DPM endeavors to:

- Provide services with integrity and professionalism
- Communicate with internal stakeholders and consultants
- Lead project teams to successful outcomes
- Balance competing priorities of the various university stakeholders
- Approach project challenges with creativity, respecting the ideas of others
- Pursue the various goals of Stanford University

For all projects, DPM must balance the following primary goals, listed alphabetically:

Cost	Deliver projects of long-term value within justifiable, benchmarked budgets
Program	Develop spaces that support the education and research mission of the university
Quality	Deliver buildings and landscapes that continue the Stanford tradition of high quality
Schedule	Deliver projects in a timely manner
Sustainability	Enhance environmental performance on both new projects and renovations

PROJECT TEAM COMMUNICATIONS

Communication among team members is the primary challenge on projects with multiple stakeholders, and is critical to successful outcomes. Respecting lines of communications is vital. The DPM project manager leads a project team of five groups formed according to function and expertise. The groups and their respective communication roles are illustrated in the Primary Communications diagram on this page. This diagram is not an organizational chart. It is a guideline for the team's primary communication responsibilities, which are described in the following pages.

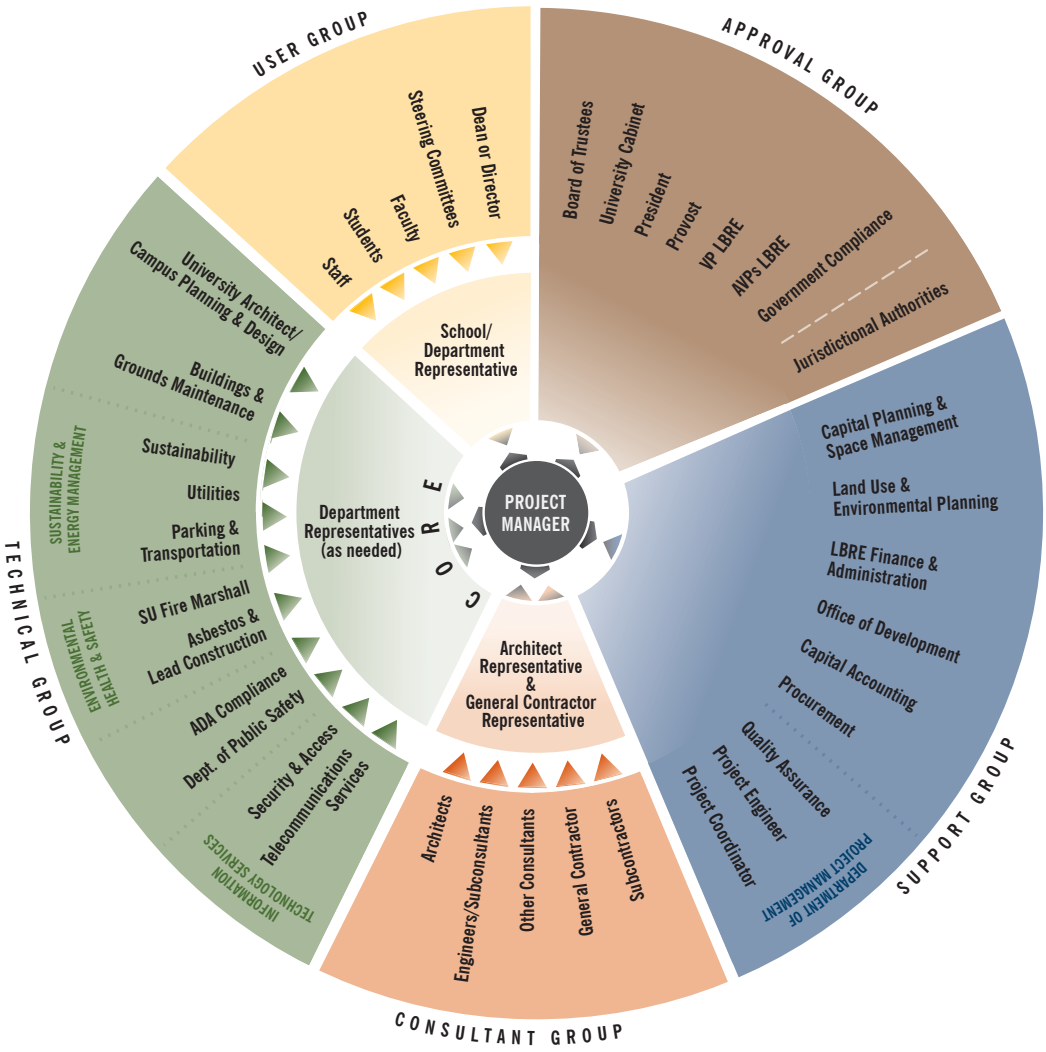
The consultant, technical, support and school/department user groups provide input, guidance, and expertise throughout the project's Design, Construction, and Closeout phases.

The approval group includes members of the university administration, who provide guidance and project approvals, and jurisdictional authorities from the communities where Stanford projects are located.

STANFORD CORE TEAM

The core team consists of the project manager, school/department user group representative(s), and technical user group representative(s), along with consultant group representative(s). Internal core team members communicate issues regarding scope, priorities, budget, and schedule from their constituents to the consultant group, and they are responsible for communication from the core team back to their constituents. The core team is responsible for day-to-day work on the project and should dedicate staff resources as projects demand.

PRIMARY COMMUNICATIONS



PROJECT TEAM PRIMARY RESPONSIBILITIES

Numerous university groups play important roles in capital projects because of their specific technical knowledge and valuable Stanford experience. The roles and communications responsibilities of the five project team groups are described below.

PROJECT MANAGER

As the project team leader, the PM alone is authorized as the university representative to provide direction and communicate decisions. The project manager must balance the needs of competing priorities such as program, sustainability, aesthetics, risk, and operations and maintenance with budget and schedule constraints.

In addition to typical project management responsibilities, the Stanford PM leads the design and construction process, from concept through turnover, and is responsible to:

- Develop and facilitate effective communication processes
- Assemble relevant university personnel, make project goals clear, disseminate information, and communicate decisions
- Resolve competing priorities and provide project team with singular, clear direction
- Facilitate and enforce process controls as outlined in the PDP
- Negotiate and manage all consultant, contractor and vendor contracts
- Educate project team about university processes, guidelines and expectations
- Challenge project team to find creative solutions
- Partner with various university groups to ensure effective turnover and verification of high performance-buildings

APPROVAL GROUP

The approval group provides authorization for each phase of the project. This group is comprised of the President, Provost, University Cabinet, Board of Trustees, LBRE Vice President, and LBRE Associate Vice President(s). It also includes representation from the jurisdictions where university lands are located. These include Santa Clara County, San Mateo County, the City of Palo Alto, the Office of Statewide Health Planning and Development (OSHPD), the City of Menlo Park, and the Town of Portola Valley.

SCHOOL/DEPARTMENT USER GROUP

The school/department user group is the program advocate throughout the project and communicates with the project team through a single designated representative. This group may be comprised of the Dean/Director, faculty, staff, and/or students.

Role of school/department user group representative: This representative is responsible for gathering, disseminating, and communicating information from the project team to their department/group as well as communicating from the department/group back to the project team within project schedule constraints. The DPM project manager coordinates directly with the school/department representative. DPM relies on collaboration with the school/department representative to express the needs of the program to the President/Provost and to manage communication and decision making within the school/department.

TECHNICAL USER GROUP

The technical user group consists of university departments and individuals that have developed general design and construction guidelines and standards. The group provides technical expertise and guidance in order to define and execute the project consistently with university goals.

Role of technical user group representative: This representative is responsible for gathering, disseminating, and communicating information from the project team to their department/group, as well as communicating from the department/group back to the project team within project schedule constraints. The DPM project manager coordinates directly with the technical user group representative. The following technical user group organizations shall assign a single point of contact to represent project scope.

University Architect/Campus Planning and Design (UA/CPD) is responsible for developing the campus master plan, along with final approval of exterior architecture/building palette, campus landscapes, and major public spaces within buildings.

Buildings & Grounds Maintenance (BGM) is responsible for maintaining academic buildings and grounds. BGM advises the project team on building and systems design to enhance building quality and provide long-term maintenance and operational efficiencies. Some schools/departments manage their maintenance services directly, including the School of Medicine (SOM), Residential & Dining Enterprises (R&DE), and Department of Athletics, Physical Education, and Recreation (DAPER).

Sustainability & Energy Management (SEM) leads campus sustainability initiatives and oversees campus utilities and transportation services. Campus Utilities is responsible for the coordination of campus utilities for all capital projects and the long-term ownership of all campus utility systems. SEM provides sustainability guidance for projects and the overall campus. SEM also advises the team regarding impacts of construction on parking and transportation systems.

Stanford University Fire Marshall's Office (SUFMO) provides fire protection engineering and code consultation, plans review, training, maintenance and inspection services, and guidance on fire safety (such as fire sprinklers, fire alarms, and emergency access). For capital projects, SUFMO provides code support for fire and like safety issues, though it is not a jurisdictional agency.

IT Services (ITS) is Stanford's central information technology organization. The ITS Facilities Engineering Group (FEG) is responsible for the design and construction of telecommunications services in university buildings. FEG provides telecommunications support to campus construction projects and is responsible for design, installation, and management of communications systems for the university.

The Diversity & Access Office (D&A) is responsible for ensuring university compliance with the civil rights laws and affirmative action obligations which mandate equal opportunity. D&A Office also ensures compliance with the state and federal laws relating to disability access, including the Americans with Disabilities Act (ADA). D&A Office can assist construction project managers in ensuring compliance with architectural regulations, including California Title 24 and the Federal ADA Accessibility Guidelines.

The Department of Public Safety (DPS) provides input on building security, vehicular traffic flow, and pedestrian and bicycle safety during the design and construction process.

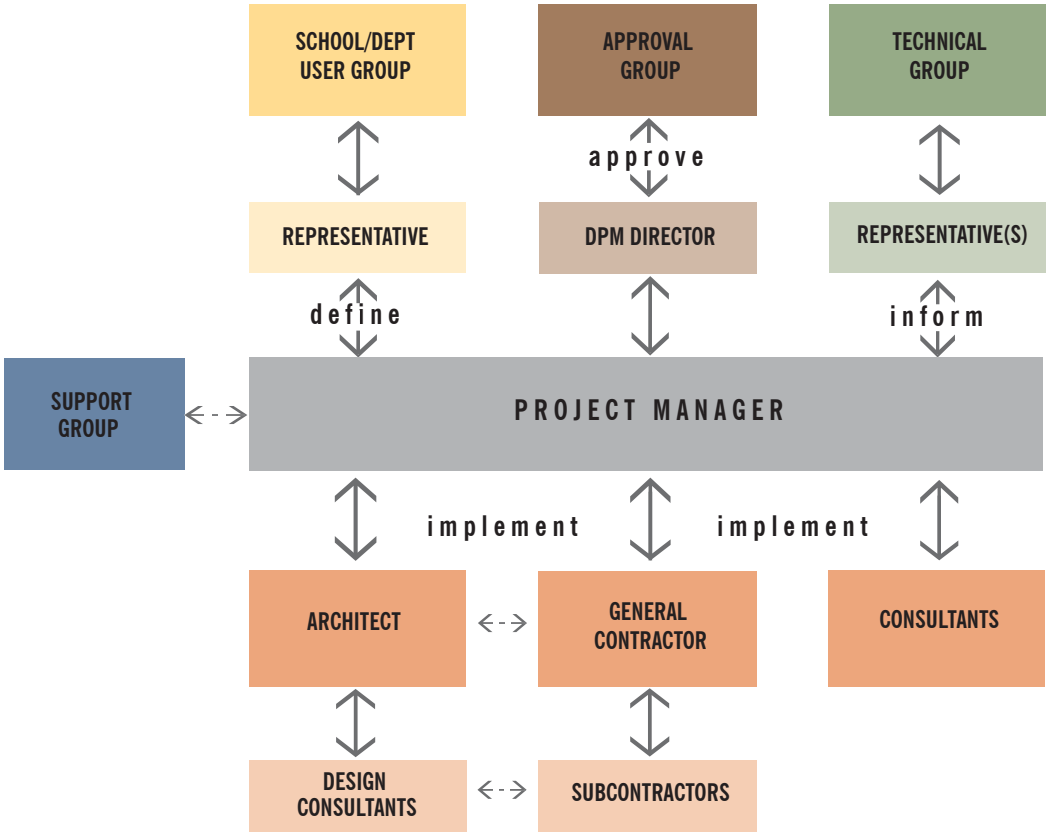
SUPPORT GROUP

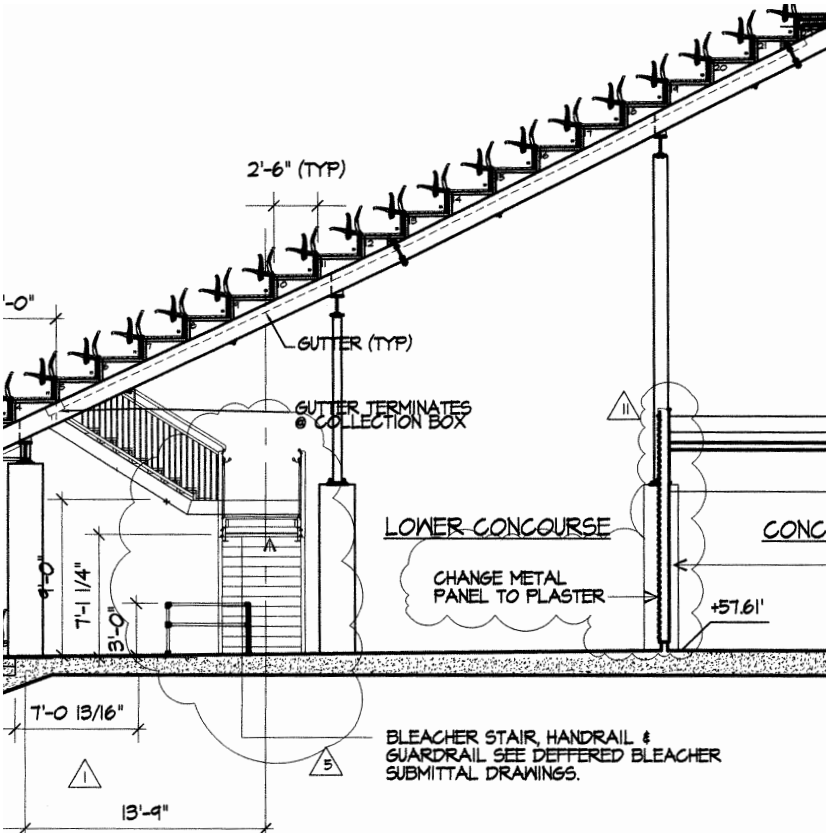
The support group consists of project engineers, quality assurance personnel, project coordinators, and financial analysts, along with university departments such as Procurement, Capital Accounting, Community Relations, and Government Compliance.

CONSULTANT GROUP

The consultant group implements the design and construction of university projects under the direction of the project manager. This group may include a range of professionals from the construction field, including designers, architects, and engineers.

TEAM ROLES & RESPONSIBILITIES





Stanford Stadium Renovation

APPROVALS AND FUNDING

APPROVALS AND FUNDING

The Board of Trustees and/or the President/Provost approve all major capital projects. LBRE facilitates the approval process with guidance from university stakeholders and project consultants.

The Provost approves projects of less than $10 million; projects of $10 million or greater and all new buildings must also be approved by the Board of Trustees' Land and Buildings Committee. The Stanford University Cabinet, which is comprised of the deans of the academic schools and the administrative leaders of nonacademic departments, reviews BoT-level capital projects. Prior to BoT acceptance, other committees and individuals may review the proposed project; a detailed list of required approvals is contained in each phase of the PDP.

The Project Heartbeat diagram represents DPM's process for identifying standard process controls in order to manage projects to desired outcomes. Each control point allows the project manager to measure risks and constraints, and provides the discipline necessary to make informed decisions regarding scope, schedule, sustainability goals, and budget, before proceeding to the next phase.

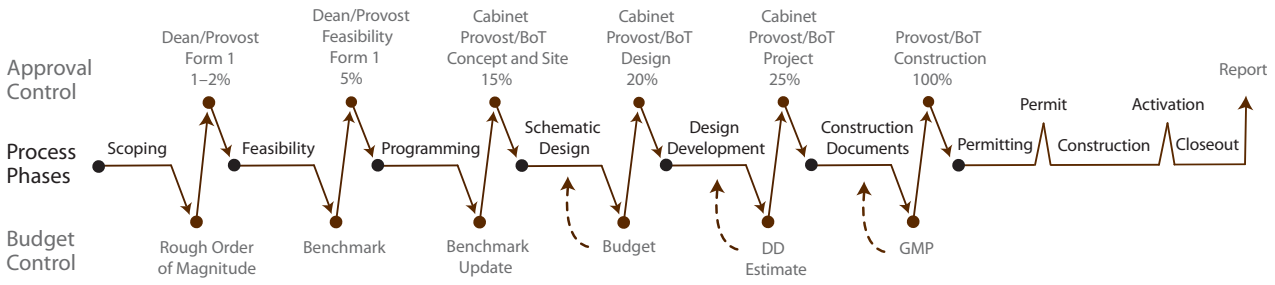
The Heartbeat diagrams below for three types of capital projects show the approval levels and authorized spending at each phase, stated as a percentage of estimated project cost. For example, when the BoT grants Design Approval, the project is funded to 20% of the presented budget. No more than this amount may be spent, or committed, without subsequent approval. The school or department must identity all the funds as a prerequisite for inclusion on the board agenda and transfer to the capital account upon approval. This funding must be identified and documented in an approved **Funding Plan or Funding Agreement** as part of the BoT submission materials.

Project timelines can vary based on project complexity, size, and risk. For scheduling purposes, it is important to note that the BoT meets only five times each calendar year (February, April, June, October, December). Materials for a BoT meeting must be submitted at least one month prior to the meeting date. If Cabinet approval is also required, materials must be submitted two months prior to the BoT meeting. The Cabinet generally reviews all projects as a precursor to BoT Concept/Site and Design Approval.

All projects start with the submission of a Form 1. The school/department representative submits the Form 1 with the assistance of Capital Planning and Space Management. The Form 1 contains a project description, including the programmatic justification, a description of the problem or opportunity, and budget and schedule constraints. The Form 1 also provides a rough order of magnitude of project cost and identifies associated funding. The approved Form 1 is forwarded to the controller's office, which assigns a capital account and funds the project as specified.

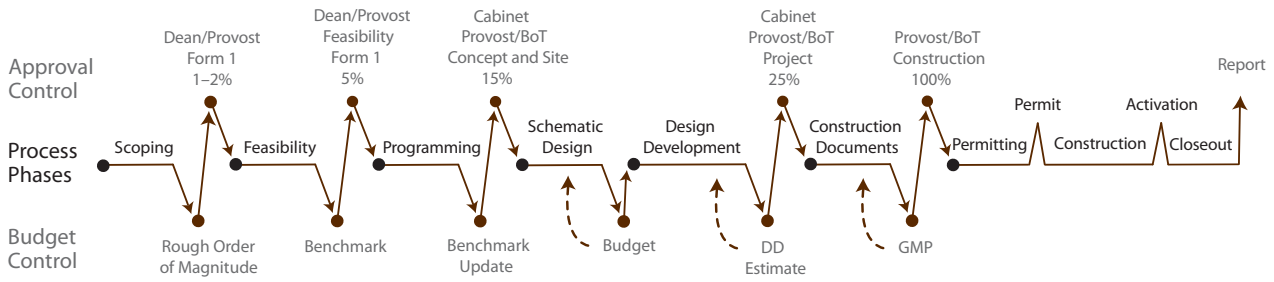
The Form 1 is the means of approval to move forward until the project is presented for BoT Concept/Site Approval. Projects that do not require BoT approval receive approval and incremental funding by additional Form 1 submittals. **No work may begin on a capital project without an approved Form 1.**

NEW CONSTRUCTION PROJECT HEARTBEAT



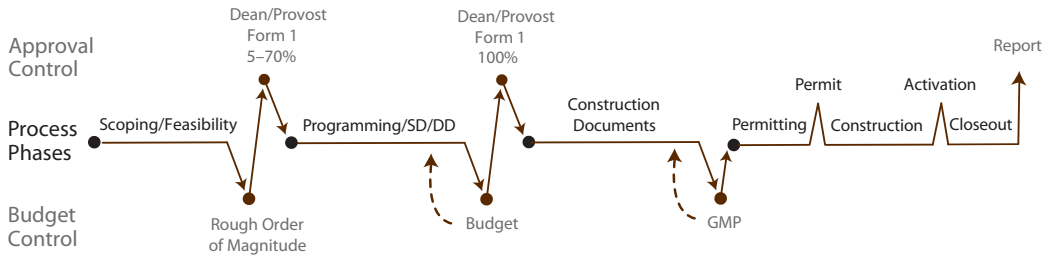
Typically, each project that involves new construction is reviewed and approved by the BoT four times prior to the start of construction, with a final report submitted after completion of construction. At each phase, the project budget, scope, and schedule are reviewed and aligned with previous approvals. The project budget is established early in the process and locked in at Design Approval. If the project team is unsuccessful in staying within the parameters presented to the Board of Trustees at Design Approval, a revised Design Approval is required; this delay will further impact the project and is strongly discouraged.

RENOVATION PROJECT HEARTBEAT

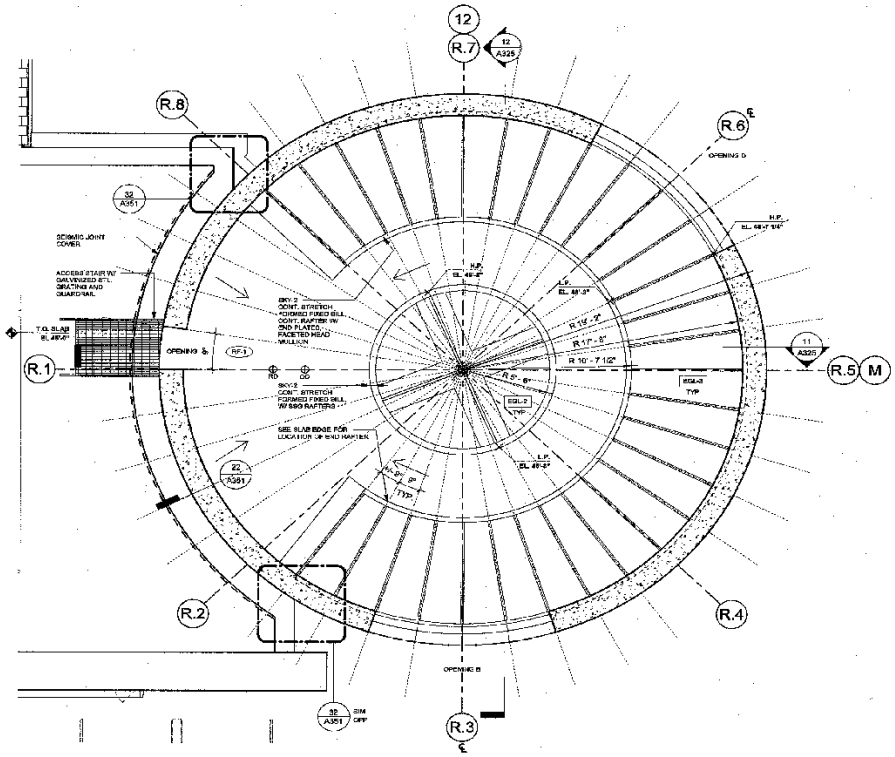


The BoT reviews renovation projects three times prior to the start of construction, with a final report submitted after completion of construction. Renovation projects that alter the site or major exterior elements must follow the process for new construction. At each phase, the project budget, scope, and schedule are reviewed and aligned with previous approvals. The project budget is established early in the process and locked in at the end of the Schematic Design (SD) phase. If the project team is unsuccessful in staying within the parameters presented to the Board of Trustees at Design Approval, a revised Design Approval is required; this delay will further impact the project and is strongly discouraged.

SMALL PROJECT HEARTBEAT



The President/Provost approves small projects through the Form 1 process. Projects costing less than $10 million follow a process similar to a new construction projects, though some approval phases may be combined. At each phase, the project budget, scope, and schedule are reviewed and aligned with previous approvals. The project budget is typically established early in the process and locked in at the end of the Design Development (DD) phase. Small projects may not proceed to the Construction phase without an approved Form 1 for the total project budget.



William H. Neukom Building - Law School

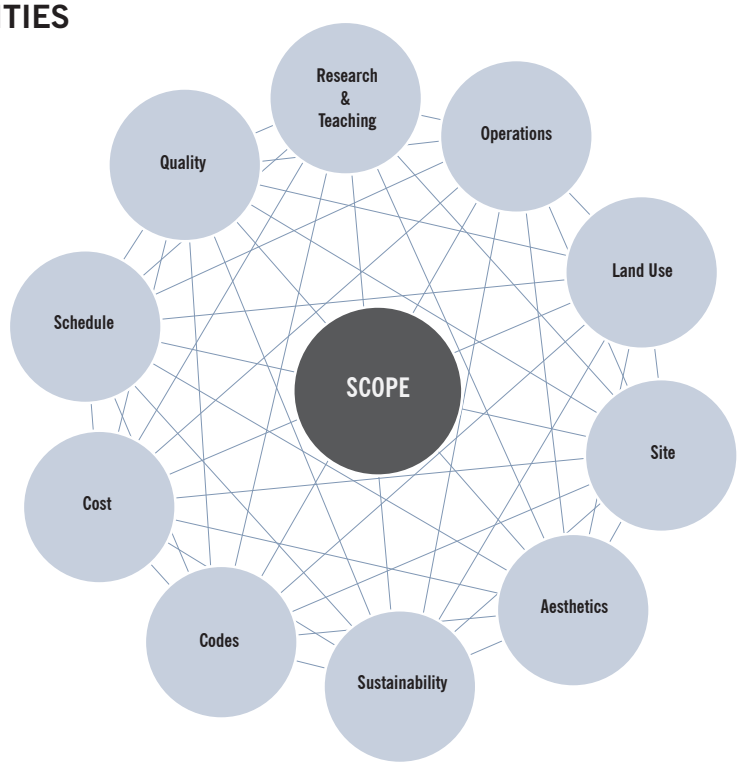
SUSTAINABILITY

SUSTAINABLE BUILDING AT STANFORD

Stanford is committed to providing a sustainable and inspiring built environment for our students, faculty, staff, and visitors. Sustainability incorporates balanced concern for future preservation of three interdependent areas: environment, economy, and equity. At Stanford, sustainability refers to ensuring that buildings not only use energy, water, and other natural resources efficiently, but also provide a safe, productive, and educational environment. Stanford recognizes that the building industry has a tremendous impact on the natural environment, both regionally and globally, and the university has the opportunity to take a leadership role in how buildings can be built to conserve resources and inspire users. Achieving this requires an integrated process with sustainability as a base criterion in all development stages.

The sustainability principles set out in the PDP are intended to aid in planning, design, and construction of new buildings and major renovations with balanced attention to environmental, economic, and social concerns. Stanford faces environmental, economic, and political challenges of greenhouse gas emissions reductions, water shortages, land use priorities, and rising operations and maintenance costs. Sustainability is one of many, often competing, criteria and priorities for building projects. These competing factors—such as cost, quality, schedule, and sustainability—are considered and balanced to support the program scope.

COMPETING PRIORITIES



Sustainability is one of several priorities that the project team must weigh in determining the best possible project outcome.

SITE DESIGN AND PLANNING

Sustainable site planning identifies ecological, infrastructure, and cultural characteristics of the site to better integrate buildings and landscape. Stanford encourages architectural/site planning that makes optimum use of natural features. Examples of sustainable site planning include a focus on district development, pedestrian and bike connections, building siting to reduce energy use, and enhancement of the existing environment.

ENERGY USE

Reducing energy use is central to creating a sustainable campus. While Stanford is building on a decades-long commitment to energy conservation and efficiency, and benefits from a temperate climate and strong state energy codes, the university has recognized that it is increasingly important to focus on building energy usage and monitoring. Examples include efficient building systems, effective control systems, and high-performance building envelopes.

WATER MANAGEMENT

Sustainable buildings conserve water resources with more efficient design and operating structures. Stanford practices sustainable water use by managing available resources to meet university needs while preserving ecological systems. Examples include native/drought–tolerant landscapes, the use of alternative water sources, and conservation.

MATERIALS, RESOURCES, AND WASTE

Waste is generated and transported to landfills throughout building demolition, renovation, and construction as well as throughout the life of the building. Sustainable design at all stages of building development, including plans to recycle and reuse construction waste, can help alleviate the pressure on landfills and natural resources. Examples include salvage and reuse of demolished materials, recycling and reduction of construction waste, design for recycling, and use of environmentally sensitive materials and products. The university is continually improving collection activities, identifying new markets for waste materials and recyclables, and raising awareness of opportunities for salvage, reuse, and recycling.

INDOOR ENVIRONMENTAL QUALITY

Research has shown that buildings with daylight, fresh air, and occupant controls are consistently rated as more comfortable and contribute to building occupants' performance and productivity. The benefits of pleasant indoor environmental quality extend to Stanford's students, faculty, and staff. Examples include integrating natural lighting and ventilation into building design.

SUSTAINABILITY IN THE PDP

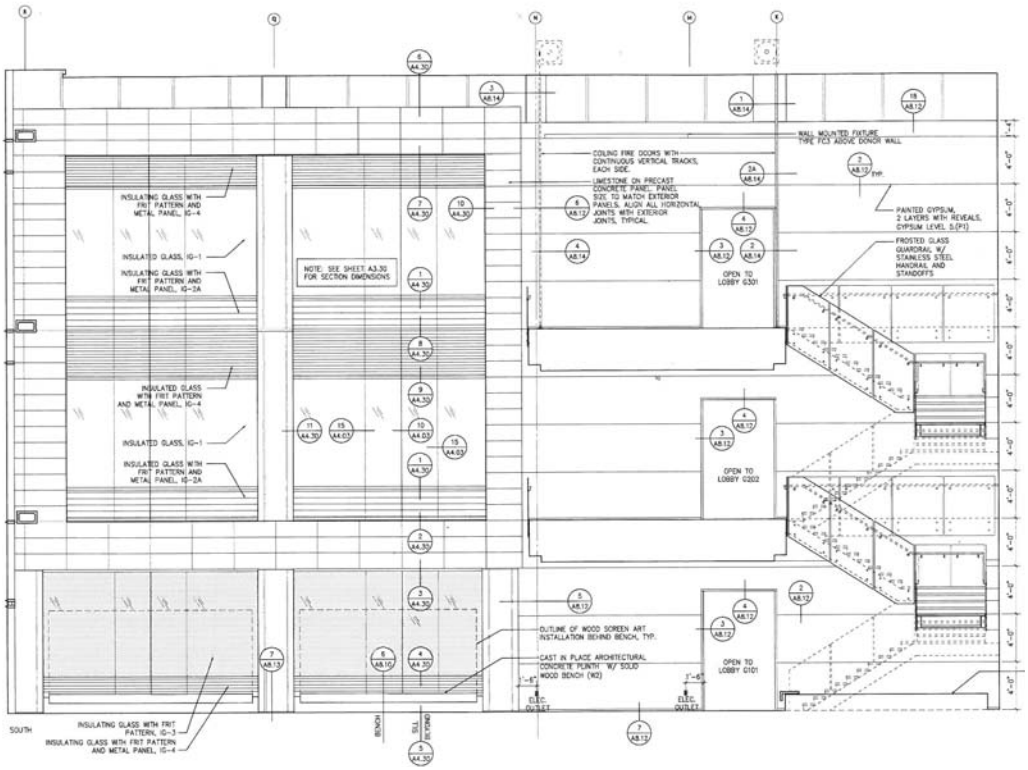
Stanford has made responsible land use planning and natural resource conservation priorities since its founding. Starting with the Main Quad, the campus was designed and built with long-term stewardship and growth in mind. The most sustainable buildings are those that balance environment, equity, and economy. To ensure this balance, the PDP uses the following strategies throughout the process phases to allow the project team to make informed decisions regarding sustainable design:

To move toward campus sustainability goals, Stanford invests in high-performing building design and systems. The ***Guidelines for Life Cycle Cost Analysis (LCCA)*** instructs project teams to consider not only the "first costs" of a building (design and construction expenses) but also long-term costs, such as operations and maintenance. The LCCA is a method of evaluating project design decisions as they relate to total building life costs. The project team assesses the value to the project of life cycle cost (LCC) comparisons in six general categories: energy systems, mechanical systems, electrical systems, building envelope, siting/massing, and structural systems. The project team analyzes which specific studies are relevant to each project. Study results that show a favorable payback are included in the project scope.

In 2008, Stanford implemented rigorous **energy and water resource reduction goals** for all new capital projects and renovations. New and significantly renovated buildings are targeted to be 30% more energy–efficient on average than current energy codes require. Stanford buildings are targeted to use at least 25% less potable water than similar traditional buildings.

Stanford has a comprehensive program for waste reduction. Construction waste and demolition debris make up a significant amount of solid waste. Construction projects are required to address **salvage and recycling** as fundamental parts of the project's parameters. Waste minimization planning is integral to optimize recycled and salvaged material and minimize cost and schedule impacts to a project.

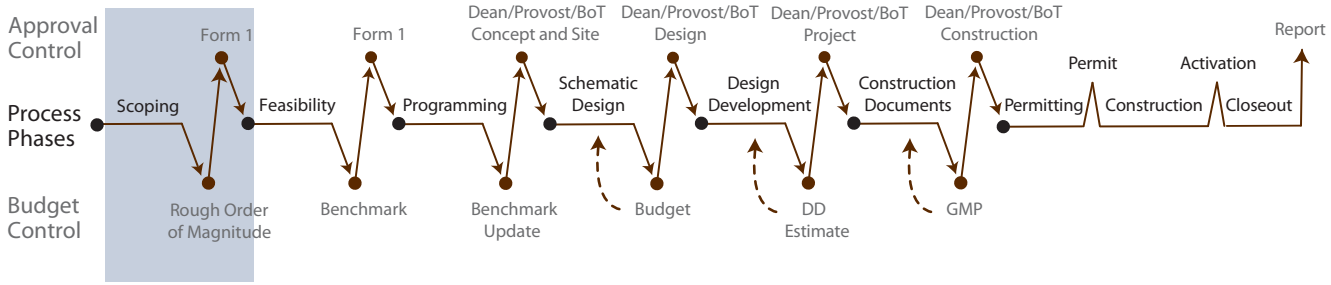
Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities systems meets defined objectives/criteria. Essentially, the commissioning process formalizes review and integration of all project expectations during planning, design, construction, and occupancy phases by inspection and functional performance testing, and oversight of operator training and record documentation. Stanford's commissioning process begins early in the Design phases. Stanford, along with the mechanical, electrical, and plumbing (MEP), designer/consultant, define the commissioning process and scope. The design consultant provides peer review and on–site verification of conformance with the design, working with the project team. A commissioning agent provides functional performance testing and verification prior to turnover. Active participation by various Stanford entities, such as DPM, BGM, and SEM is critical to an effective turnover of high-performing building systems.



Lorry I. Lokey Stem Cell Research Building (SIM 1)

PROCESS PHASES

SCOPING



Translate academic or departmental initiatives into potential facilities needs.

During the Scoping phase, the Department of Capital Planning and Space Management along with University Architect/Campus Planning and Design, Land Use and Environmental Planning, DPM, and members of the school/department user group identify program requirements and conduct preliminary site analyses to determine whether a capital construction project is necessary. This phase includes space needs assessments and definition of project parameters.

If a capital project is desired, the Scoping Document should identify constraints and outline options to be studied in the Feasibility phase. Sustainability goals should be introduced to the project team in this phase so they can be considered with other information as the Project Scoping Document is developed.

The user representative submits a Form 1 in order to document the project goals and boundaries. This request formally initiates the project and is the mechanism that provides the Provost's approval for moving ahead.

›› *Resources for the Scoping phase, including checklists and form templates, are online at:* ***http://lbre.stanford.edu/dpm/PDP_Process***

TASKS

Project Controls & Logistics

Budget	Identify rough order–of–magnitude cost and budget constraints/risks
Funding	Confirm funding strategy outlined in the Capital Plan
Schedule	Define project milestones
Internal reviews	Engage internal stakeholders as required
Board of Trustees	N/A
Logistics	Establish preliminary site logistics plan
Administration	Identify internal team
Jurisdictional	Identify applicable General Use Permit (GUP) conditions
Outreach	N/A

Building Program

School/Dept(s)	Reference space guidelines and existing space studies; identify surge and relocation needs; determine vacated space backfill plans
Building	Identify existing facilities and site limitations

Sustainability

Clarify general sustainability goals and identify potential strategies

DELIVERABLES

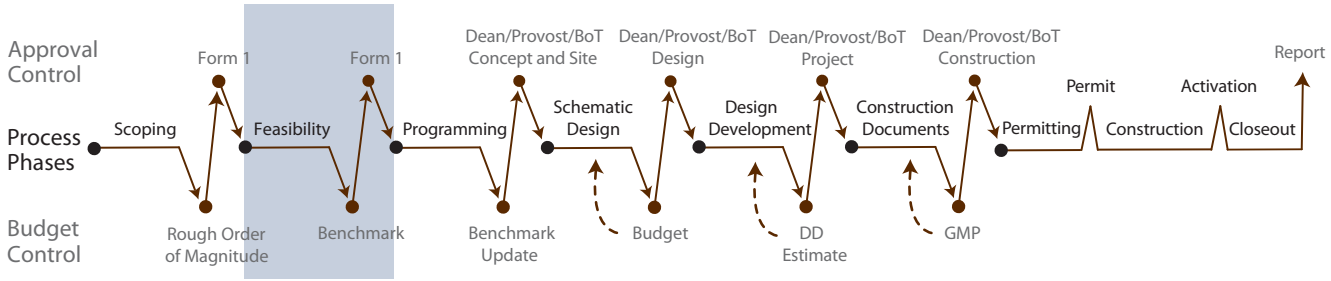
Scoping Document

Signed Form 1 (required before proceeding with Feasibility Study)

APPROVALS

Signed Form 1 serves as approval for the Scoping phase

FEASIBILITY



Identify and develop options based on the Project Scoping Document. The Feasibility phase ends with the selection of one option to be further defined in Programming.

DPM leads the school/department user group, technical user group, and consultant group in developing each option to the extent necessary to identify key site, utility, and building relationships; preliminary space programming requirements; sustainability goals and features; building systems needs; and seismic, accessibility, environmental, architectural, and hazardous materials issues. Sustainability activities include clarifying goals and identifying potential strategies. Additional design consultants or studies may be required to meet these goals, and potential impacts on construction costs should be defined at this time.

The project team identifies project risks and contingencies, establishes a benchmark budget and project schedule, and presents a strategy for surge. This phase may be completed in combination with programming. The project manager may select a design team and general contractor in this phase.

Upon approval, the school/department submits a subsequent Form 1 authorizing additional funding to proceed with one selected option to be developed in the Programming phase.

›› *Resources for the Feasibility phase, including checklists and form templates, are online at:* ***http://lbre.stanford.edu/dpm/PDP_Process***

TASKS

Project Controls & Logistics

Budget	Develop benchmark budgets for each option, including construction and soft costs
Funding	Develop draft funding plan for each option
Schedule	Develop project schedule for each option
Internal reviews	Submit feasibility report to internal stakeholders for review
Board of Trustees	Prepare draft Concept Approval presentation, and report if required
Logistics	Identify site logistics concerns
Administration	Identify roles and responsibilities of internal and external teams; determine consultant selection process
Jurisdictional	N/A
Outreach	Outline community outreach goals

Building Program

School/Dept(s)	Itemize program parameters and requirements
Exterior/Site	Identify existing conditions: define site boundaries and utilities scope
O&M/MEP	Identify technical criteria/considerations; confirm applicable guidelines (Site and Design Guidelines, Facilities Design Guidelines [FDG])
Life Safety/ADA	Define fire/ADA access routes
Structural	Determine seismic performance criteria and structural peer review process

Sustainability

Clarify sustainability goals and identify potential strategies

DELIVERABLES

Feasibility Study (all options)

Approved Form 1, with funding strategy providing authorization to proceed with Programming phase

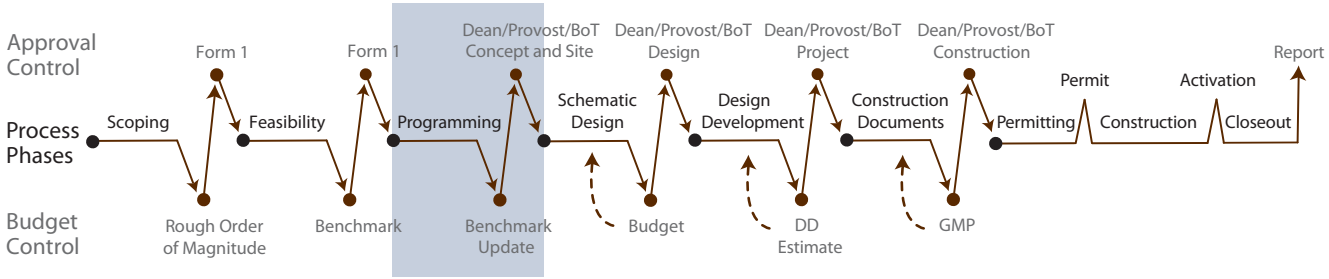
APPROVALS

Dean/Department and/or user representative

Vice President, LBRE

President/Provost

PROGRAMMING



Develop detailed program for one option selected in the Feasibility phase.

The Programming phase will confirm that the design requirements meet program needs of the user group with a degree of detail that enables the project team to obtain Board of Trustees Concept and Site Approval (or just Concept Approval if the project is a renovation with no site impacts).

This phase includes an initial study of site constraints and impacts, site-related design guidelines, diagrammatic floor and stacking plans, a space program, a building systems description, a summary schedule, and a preliminary budget with comparable benchmarks. The project manager should arrange a sustainability work session to review the principles of sustainability as they relate to building design, construction, and operation.

The project team should consider sustainability as it relates to project siting, orientation, and design guidelines, and discuss strategies that yield efficiencies in building space and function. The team should understand the benefits and potential costs when including sustainability features.

The project manager will schedule a kick-off meeting at the start of this phase to confirm project goals. The project team will reconfirm planning and design goals from the Feasibility phase, conduct user interviews, and establish and evaluate space data. The team will also develop a benchmark-level schedule and cost model to be included in the Programming Report, the major deliverable for this phase. The report provides the baseline for the project scope, schedule, and budget.

DPM prepares a report and presentation summarizing the Programming Report, preliminary schedule, updated benchmark budget, and Funding Plan for the Board of Trustees for Concept and Site Approval (for new construction) or Concept Approval (for renovations that do not impact the site).

›› *Resources for the Programming phase, including checklists and form templates, are online at:* ***http://lbre.stanford.edu/dpm/PDP_Process***

TASKS

Project Controls & Logistics

Budget	Develop construction cost model and preliminary project budget; conduct space cost reviews
Funding	Develop a Funding Plan
Schedule	Develop preliminary baseline schedule
Internal reviews	Conduct stakeholder interviews
Board of Trustees	Prepare Concept Approval report/presentation
Logistics	Develop preliminary site logistics plan
Administration	Select and contract project consultant team
Jurisdictional	Determine special studies required by the GUP
Outreach	Outline community outreach plan

Building Program

School/Dept(s)	Conduct user interviews; reconcile program with space guidelines
Exterior/Site	Confirm design criteria and applicable site guidelines
O&M/MEP	Confirm applicable design guidelines; prepare draft basis of design
Structural	Confirm seismic performance level; present conceptual design to Seismic Advisory Group (SAG)

Sustainability

Energy use	Confirm target energy savings
Water usage	Confirm target water savings
Utilities	Identify preliminary loads & connection points

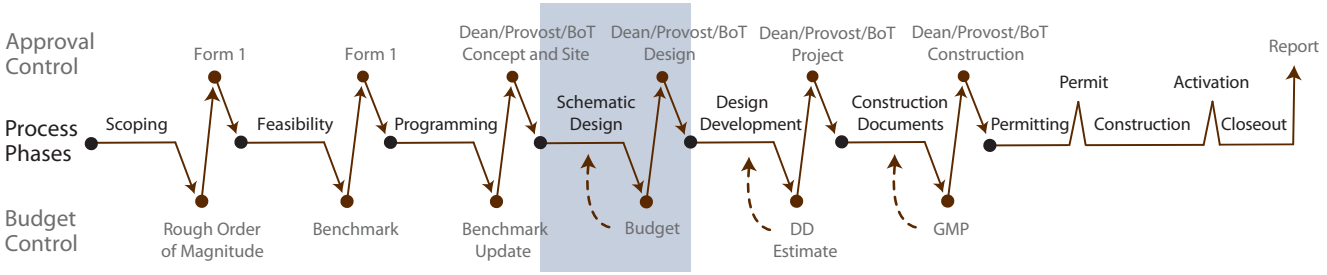
DELIVERABLES

- Programming Report
- Updated benchmark/contractor estimate
- Project outline schedule
- Funding Plan
- Board of Trustees report/presentation (materials prepared by the design team)

APPROVALS

- Dean/Department and/or user representative
- Vice President, LBRE
- President/Provost
- University Cabinet
- Board of Trustees—Concept Approval

SCHEMATIC DESIGN



Prepare Schematic Design (SD) documents to a level that allows scope, budget, and schedule to be set.

During this phase, the core group develops project goals and measurement criteria, which serve as a road map to define successful outcomes. It is imperative that the project team understand the importance of this phase, as the core team must commit to project parameters, including scope, schedule, and budget. The project manager should foster an informed decision making process and evaluate input from various university stakeholders.

On Stanford projects, the SD package is developed beyond industry standard, in order to provide a true representation of the scope and allow the project manager to fully assess project budget, schedule, and risks. The success of the project ultimately will be measured against the scope, budget, and schedule defined in the SD package.

Key sustainability features are defined in SD. Design options are analyzed in order to meet sustainability goals. Tools such as LCCA are employed by the project team to inform and facilitate optimal building performance.

The project team further defines the design requirements developed in the Programming phase (per the Concept and Site Approval). The project manager is responsible for developing the entire project budget, including all construction and soft costs. The consultant group develops the SD package with input from the university team; this should provide the project manager and contractor/cost estimator (when applicable) with sufficient information to develop a budget. The internal university technical team members provide budgets for Stanford direct costs, such as utility connections, ITS infrastructure, etc.

The project manager, working with LBRE, creates a report and presentation for the Board of Trustees summarizing information from the SD documents, budget, schedule, and Funding Plan. LBRE presents an overview of the project—including design, budget, schedule, and risks—to the Board of Trustees for Design Approval. Changes to the project scope, schedule, or budget after this step in the process are strongly discouraged and ultimately may not be achievable.

» *Resources for the Schematic Design phase, including checklists and form templates, are online at:* ***http://lbre.stanford.edu/dpm/PDP_Process***

TASKS

Project Controls & Logistics

Budget	Obtain contractor line item budget based on 100% SD drawings; develop final project budget
Funding	Review Funding Plan and requirements
Schedule	Establish project baseline schedule
Internal reviews	Prepares stakeholder reviews
Board of Trustees	Prepare Design Approval presentation
Logistics	Finalize preliminary site logistics plan
Administration	Select General Contractor (GC) for pre-construction services
Jurisdictional	Complete Architecture and Site Approval (ASA) package, preliminary jurisdictional review
Outreach	Define community outreach plan

Building Program

School/Dept(s)	Confirm SD meets Programming Report
Exterior/Site	Develop 100% SD plans as required for ASA and BoT Design Approval
O&M/MEP	Select and define specific building systems
Life safety/ADA	Select and define specific building systems
Structural	Perform a peer review of preliminary design

Sustainability

Verify design meets sustainability goals, perform applicable life cycle cost analyses, and identify opportunities for reuse, recycling, and salvage; develop a preliminary commissioning plan

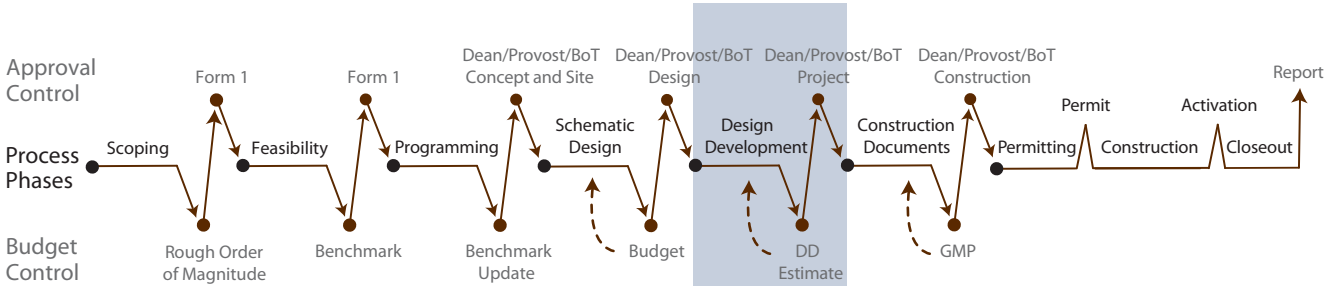
DELIVERABLES

100% SD documents
Project budget (reconciled to benchmark)
LCCA/sustainability report(s)
Project schedule
Board of Trustees report/presentation, presentation materials
Santa Clara County ASA submittal package (if required)
Funding Agreement

APPROVALS

Vice President, LBRE
Dean/Department and/or user representative
President/Provost
University Cabinet
Board of Trustees—Design Approval

DESIGN DEVELOPMENT



Prepare Design Development (DD) documents to a level that allows detailed design and coordination as outlined in the schematic design documents.

In the DD phase, the drawings are developed to a level of detail necessary to prepare a clear, coordinated description of all aspects of the project. Major project elements, including equipment, fire protection, mechanical, electrical, structural, telecommunications, and plumbing systems, are designed and coordinated through enlarged scale drawings and detailed elevations and plans. The project manager and general contractor may engage design/build subs to ensure well-coordinated drawings and cost estimates.

The design team calculates capital and life cycle costs for individual sustainability components, and considers costs and savings in relation to performance to ensure informed decisions. It is crucial that the design team fully details these features and integrates them into the project design. The schedule should allow adequate time for implementing activities that may lead to a more sustainable and coordinated project, such as demolition, waste diversion, commissioning and project turnover for successful maintenance.

The DD phase is not an opportunity to add scope. The goal is to refine what was designed in SD. Additions to scope in this phase will likely require reduction or elimination of other scope elements, and delay the schedule. Additional review and approval by university management and possibly the BoT may also be required.

Design and construction costs associated with all project elements should be clarified. The project team is focused on integrating all program requirements into the design in order to provide the contractor with the information necessary to complete a comprehensive project DD estimate. ***If the DD estimate is not consistent with the budget set at SD, then scope and budget realignment is required.***

DPM summarizes the completed DD documents, DD estimate, Funding Agreement (for renovations), and schedule and presents them to the Board of Trustees for Project Approval.

›› *Resources for the Design Development phase, including checklists and form templates, are online at:*
http://lbre.stanford.edu/dpm/PDP_Process

TASKS

Project Controls & Logistics

Budget	Reconcile DD budget with 100% SD budget
Funding	Review Funding Plan/requirements
Schedule	Review/update project baseline schedule
Internal reviews	Send DD drawings to project team for review
Board of Trustees	Prepare Project Approval report/presentation
Logistics	Update preliminary site logistics plan
Administration	Select design/build subcontractors
Jurisdictional	Prepare jurisdictional update with DD plans
Outreach	Refine community outreach plan

Building Program

School/Dept(s)	Finalize furniture, keying/access control, telecom, A/V & signage plans
Exterior/Site	Develop 100% DD package based on approved SD drawings
O&M/MEP	Develop 100% DD package based on approved SD drawings
Life safety/ADA	Develop 100% DD package based on approved SD drawings
Structural	Incorporate peer review comments in DD plans

Sustainability

Verify that design continues to meet or exceed sustainability goals; update life cycle cost analyses; identify additional opportunities for reuse, recycling, and salvage. Develop system-specific commissioning plans.

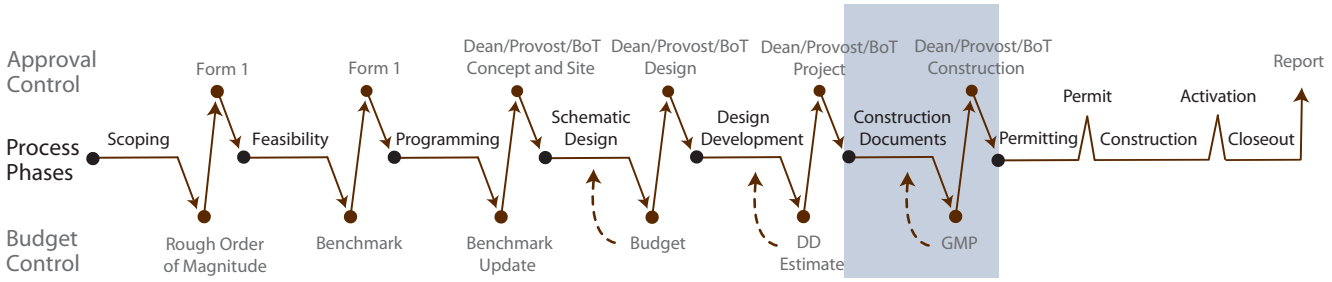
DELIVERABLES

- 100% DD documents
- DD construction estimate
- DD project budget (reconciled to design approval)
- Project schedule
- Value of components for early approval (demolition, steel, skin, etc.)
- Board of Trustees report/presentation

APPROVALS

- Vice President, LBRE
- Dean/Department and/or user representative
- President/Provost
- Board of Trustees—Project Approval

CONSTRUCTION DOCUMENTS



Prepare complete, coordinated Construction Documents (CD), that detail the design in order to bid, permit, and construct the project.

The consultant group produces the contract documents, including final drawings and specifications for all components and building systems. The CD phase is the final stage of the design process. The general contractor and design/build contractors are responsible for constructability and drawing coordination, and for confirming the construction budget.

Changes to the scope or program in this phase will likely incur budget impacts and schedule delays. These may require reduction or elimination of other scope, and additional review by university management and possibly the BoT.

During this phase, the user group and technical group perform an interim review of the drawings and specifications and advise the consultant group of any conflicts with the previously signed-off Design Development drawings. The seismic peer reviewer provides final comments to the project manager.

Upon completion of this phase, the contract documents are bid, the schedule is finalized, soft costs are confirmed, and DPM presents a summary of CD information to the Board of Trustees for Construction Approval.

» *Resources for the Construction Documents phase, including checklists and form templates, are online at:* ***http://lbre.stanford.edu/dpm/PDP_Process***

TASKS

Project Controls & Logistics

Budget	Finalize guaranteed maximum price (GMP) budget (95%–100% CD); reconcile to DD estimate
Funding	Develop Funding Agreement
Schedule	Prepare project baseline schedule
Internal reviews	Complete technical and user group reviews; complete structural peer review
Board of Trustees	Prepare construction approval report/presentation
Logistics	Prepare final site logistics plan
Administration	Review proposed subcontractor bid lists
Jurisdictional	Submit to county/city for plan check
Outreach	Refine community outreach plan

Building Program

School/Dept(s)	Finalize furniture, keying/access control, telecom, A/V and signage plans
Exterior/Site	Complete 100% CD drawings and final specifications based on approved DD drawings
O&M/MEP	Complete 100% CD drawings and final specifications based on approved DD drawings
Life safety/ADA	Complete 100% CD drawings and final specifications based on approved DD drawings
Structural	Complete final peer review

Sustainability

Detail and coordinate sustainability components as part of building systems and utilities plans; finalize commissioning plan

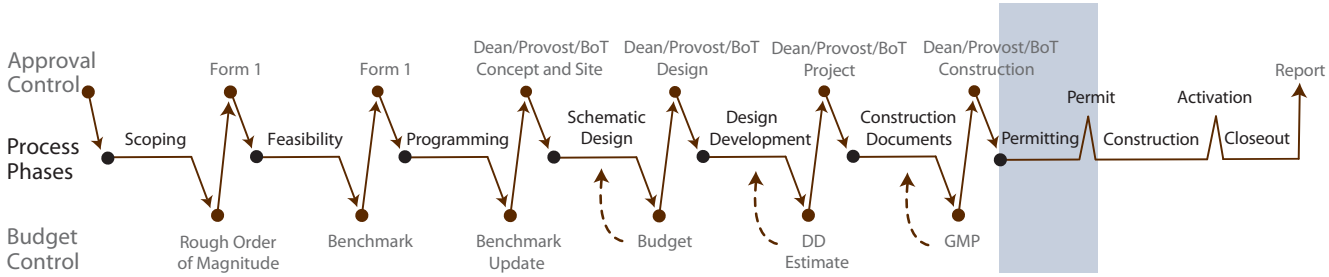
DELIVERABLES

- 100% contract documents (complete and coordinated)
- General contractor GMP
- Project budget and schedule
- Construction Management Plan
- Funding Agreement
- Board of Trustees report/presentation

APPROVALS

- Vice President, LBRE
- Dean/Department and/or user representative
- President/Provost
- Board of Trustees—Construction Approval

PERMITTING



Submit CDs to jurisdictional authorities for plan review to obtain necessary construction permits.

No significant construction activity may commence without the necessary permits and approvals. Mobilization and site preparation can commence at the discretion of the project manager. The architect facilitates the permit process, including building, demolition, land development/grading, utilities, environmental health, and other project aspects as required. The architect leads all communication with the jurisdictional agency, using the resources of the project team as necessary to provide a coordinated response to comments and resolve permit issues. For MEP design/build projects, the general contractor/subcontractor is responsible for obtaining individual systems permits, such as plumbing, electrical, sprinkler, and fire alarm. Each project's permitting schedule varies depending on the project's location, complexity, and phasing.

The majority of Stanford lands are in Santa Clara County, with the County Building Inspection Office responsible for plan checks and issuing building permits. The Santa Clara County Fire Department is the jurisdiction for fire and life safety plan review and inspections. Santa Clara Land Development Engineering reviews design and construction of civil work.

For some projects the City of Palo Alto has jurisdiction. For most projects within the Medical Center, the California Office of Statewide Health Planning and Development has jurisdiction.

Some Stanford lands are located in San Mateo County, with the San Mateo County Building Inspection Office responsible for plan checks and issuing building permits.

›› *Resources for the Permitting phase, including checklists and form templates, are online at:* ***http://lbre.stanford.edu/dpm/PDP_Process***

TASKS

Project Controls & Logistics

Budget	Bid any remaining trades; incorporate permit comments in final budget
Funding	N/A
Schedule	Complete final detailed construction and project schedule
Internal reviews	Submit final plans to user representative and technical team for reference only
Board of Trustees	N/A
Logistics	Confirm final site plan is included in budget; review with internal stakeholders
Administration	Issue GMP construction contract
Jurisdictional	Obtain required permits
Outreach	Communicate building logistics to neighbors and university stakeholders

Building Program

The building program is complete and has been incorporated into final drawings.

Sustainability

Sustainability components have been incorporated into the final documents.

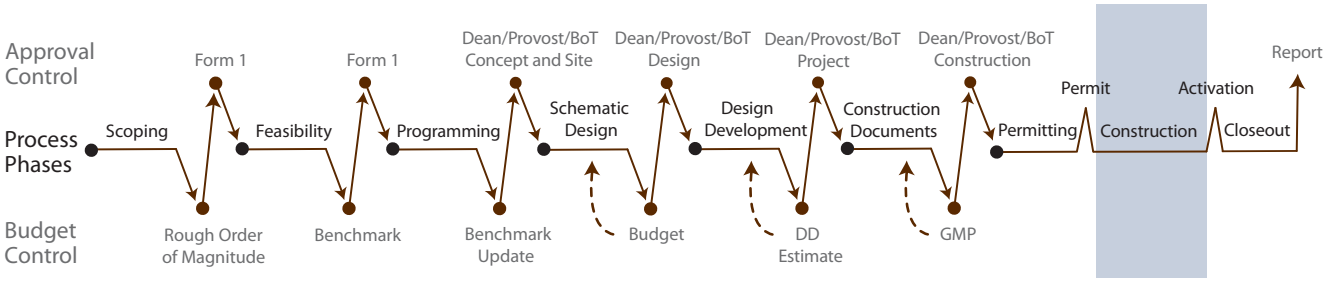
DELIVERABLES

100% permit documents (complete and coordinated)
General contractor GMP
Updated budget and schedule (including permit impacts)
Construction permit(s)

APPROVALS

Jurisdictional agencies

CONSTRUCTION



Safely construct project in accordance with contract documents, and within budget and schedule.

Throughout the course of construction, the PM, architect, and contractor meet weekly on site to report on the construction track submittal status, budget, and schedule; and to resolve field conflicts and drawing discrepancies. The contractor's project manager leads the owner/architect/contractor (OAC) meetings, sets the agenda, and documents decisions and outcomes. The contractor's project superintendent reports on the project's safety program and site logistical concerns and provides weekly updates to the construction schedule.

The general contractor is tasked with coordinating their delivery and installation, and facilitating the inspection process to allow building occupancy. The DPM quality assurance/quality control team representative inspects the site regularly in order to ensure quality and conformance with the contract documents. Toward the end of construction, the contractor begins commissioning the building systems according to the previously outlined commissioning plan.

The user and technical team representatives are copied on OAC meeting minutes and attend OAC meetings as needed to assist in resolving field issues. DPM will route relevant submittals and RFI's to user and technical team representatives for review. The OAC meeting is not a forum for discussion or consideration of changes to the project beyond the BoT approved scope of work. All Stanford stakeholders must direct questions or comments about the construction to the project manager (see communication diagram on page 5). The PM provides all direction to the GC and design team.

» *Resources for the Construction phase, including checklists and form templates, are online at:* ***http://lbre.stanford.edu/dpm/PDP_Process***

TASKS

Project Controls & Logistics

Budget	Track project costs and report status monthly
Funding	100% of project funding must be available
Schedule	Track project schedule and report status monthly
Internal reviews	Conduct periodic construction walk-throughs; submit reviews as required
Board of Trustees	N/A
Logistics	Notify stakeholders of changes to site logistics
Administration	Conduct weekly OAC meetings
Jurisdictional	Conduct inspections (jurisdictional, special inspection, internal quality assurance)
Outreach	Maintain site notification with neighbors

Building Program

The building program is complete and has been incorporated into final drawings.

Sustainability

Begin building commissioning

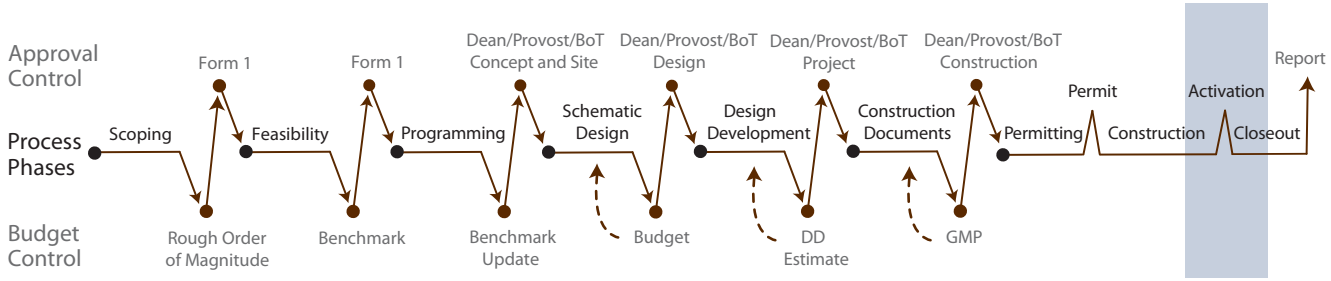
DELIVERABLES

Contractor rolling schedules
Contractor RFI, submittal, and change request logs
A&E site observations
Punch list
Letter of substantial completion
Signed-off permits (final inspections)

APPROVALS

Jurisdictional authorities

ACTIVATION



Facilitate turnover of completed project for user occupancy and ongoing operations and maintenance.

The activation process begins with planning in the Design phases and continues during construction until final occupancy and turnover of the facility. Activation entails commissioning and turnover of building systems for long-term operations along with furnishing and outfitting the facility for user occupancy.

During the Construction phase, the project manager will convene a turnover team consisting of members of the project technical team. This group will meet regularly to ensure effective transition of the building stewardship from DPM/GC to BGM/SEM and facilitate the transfer of project documentation to Maps & Records. While the building systems are being installed, DPM will provide periodic tours of the systems to familiarize the operations staff with the systems. Once the contractor has completed the initial start-up of the building systems, DPM facilitates the conducting of BGM and SEM and/or an outside commissioning agent of functional performance testing and verification to ensure the building is operating as designed.

The user representative works with the PM to plan building occupancy tasks such as phone/data activation, card access, security, signage, and audio/visual and furniture installation. These systems should be planned and selected during the Design phase so they can be fully coordinated with building systems and properly incorporated into the budget and schedule. The user representative provides the appropriate occupant information so these systems can be procured and installed per the project schedule. The user representative will assist in move planning and coordination. The school/department is responsible for leaving any spaces vacated clean, empty of contents, and operational. If lab spaces are vacated, the school/department must facilitate lab closure.

›› *Resources for the Activation phase, including checklists and form templates, are online at:* ***http://lbre.stanford.edu/dpm/PDP_Process***

TASKS

Project Controls & Logistics

Budget	Track costs for activation scope
Funding	N/A
Schedule	Track activation schedule
Internal reviews	Complete training programs; organize building turnover meetings
Board of Trustees	N/A
Logistics	Demobilize and restore site
Administration	Vendor proposals and contracts
Jurisdictional	Acquire Beneficial Occupancy
Outreach	N/A

Building Program

School/Dept	Move-in; coordinate Furniture, Fixtures and Equipment (FF&E) decommission vacated space

Sustainability

Complete commissioning and post-occupancy evaluation

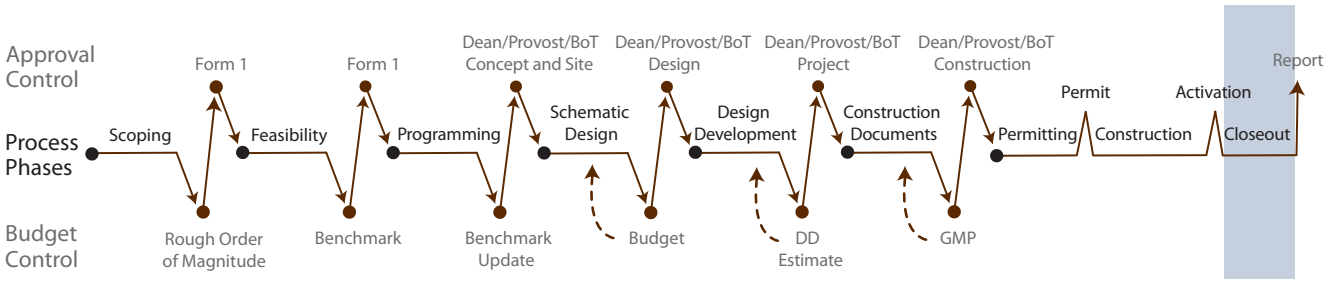
DELIVERABLES

Certificate(s) of occupancy
Turn-over documents
Energy model

APPROVALS

Project Manager
Facility Coordinator
Building Manager
Zone Manager
Director, DPM
Dean/Department and/or user representative

CLOSEOUT



Facilitate administrative financial closeout of the complete and fully commissioned project.

Upon receipt of a Certificate of Occupancy (CO), the facility is occupied, maintenance responsibilities begin, and depreciation and debt service (where applicable) transfer to the school/department.

The project manager submits a turnover letter to the user and BGM/SEM to notify them that warranties are in effect and maintenance responsibilities have been transferred. Within three months of completion, the PM facilitates submittal of all appropriate closeout documents.

After move-in, the project team continues to be responsible for completing all jurisdictional, legal, and contractual obligations; reconciling the project accounting with the Controller's Office; evaluating and reporting the project outcomes; conducting warranty reviews three months after occupancy for landscape and eleven months after occupancy for equipment; transferring all project records to the appropriate departments; and officially retiring the project.

Financial closure: The Closeout phase lasts through the duration of the project warranties (typically one year), but the project should be financially closed within six months after the project is complete. Financial closure requires that all contract work be completed, as-built documents received and submitted to Maps & Records, lien releases filed, final invoices submitted and paid, project accounting reconciled with the university's financial system, funding surpluses returned, and the project account retired.

›› *Resources for the Closeout phase, including checklists and form templates, are online at:* ***http://lbre.stanford.edu/dpm/PDP_Process***

TASKS

Project Controls & Logistics

Budget	Closeout project contracts; reconcile final project cost; close capital account
Funding	Report remaining funding to be returned
Schedule	N/A
Internal reviews	Conduct post–occupancy evaluation
Board of Trustees	Report final cost
Logistics	Demobilize and restore site
Administration	Submit complete as-built drawings to Maps & Records
Jurisdictional	Submit Certificate of Occupancy to Capital Accounting
Outreach	N/A

Building Program

School/Dept	Decommission vacated space

Sustainability

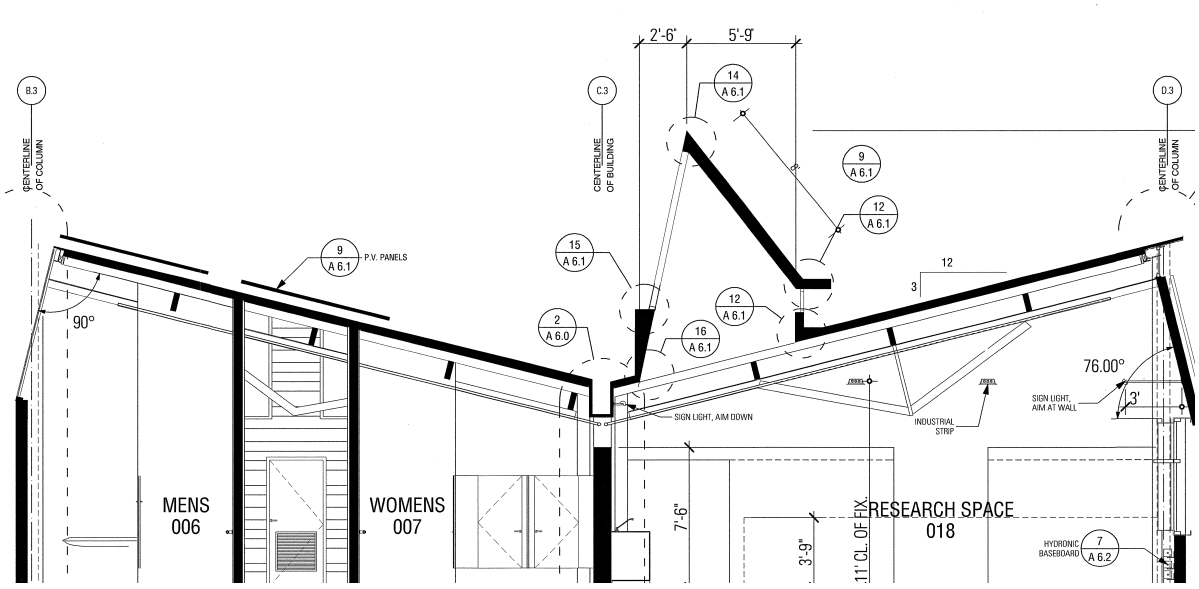
Complete final commissioning and post-occupancy evaluation

DELIVERABLES

- Completed punch list
- As-built drawings and O&M manuals
- User and maintenance turnover letter(s)
- Commissioning report

APPROVALS

- Project Manager
- Facility Coordinator
- Building Manager
- Zone Manager
- Director, DPM
- Director of Finance, LBRE
- Controller's Office
- Dean/Department and/or user representative



Leslie Sun Field Station Jasper Ridge Biological Preserve

PROJECT CONTROLS

PROJECT ADMINISTRATION

CONTRACTS

In order to execute a contract, Stanford must have the consultant or contractor respond to a request for proposal (RFP) or some other document describing the scope and nature of the project, the type of professional services required, cost of work, schedule, and the deliverables necessary to complete the project. The RFP package should include a copy of the standard contract so that the consultant or contractor will be able to respond with an understanding of the terms of the proposed contract.

DPM thoroughly reviews (but does not sign) each proposal to ensure that it addresses all work required and includes appropriate fees for all services that have been requested. All exclusions and allowances in the proposal must be stated clearly and agreed to by the Stanford PM. Stanford does not allow the use of vendor contract forms; Stanford Contracts forms are used exclusively. The Procurement Department also will review the proposal to make sure it is consistent with the stipulations in the standard contract. For time-sensitive proposals, DPM and Procurement reviews should happen concurrently to ensure that all required modifications are identified quickly. After this review, and prior to beginning work, the terms surrounding the scope of work must be documented in a bilaterally executed contract.

If there are areas of concern over contract language that cannot be resolved or if any significant alterations are made to the contract, Procurement or DPM may involve Stanford legal advisors. Procurement will handle tasks required to finalize contract terms, review proposed changes with the project manager, and send the contract to the consultant/contractor for signature. The project manager must ensure that communications between Procurement and the consultant continue and that contract terms are settled quickly, as **no work may commence without an executed contract**.

INVOICES AND PAYMENT APPLICATIONS

DPM's policy is to pay all invoices in a timely and expedient manner according to the terms of the contract. To facilitate the timely processing of invoices and payment applications, LBRE financial analysts and accounting associates are integral parts of the project team.

Invoices and payment applications must be mailed, emailed, or hand-delivered to LBRE's Finance Department. All invoices and payment applications are date-stamped upon receipt and logged into DPM's project management database. They are stamped again with a proof of payment that includes the capital account number and the LBRE project number.

The invoices are first routed to the LBRE financial analyst supporting the project. The financial analyst reviews the invoice package to ensure it is accurate, complete, and in compliance with the contract (e.g., that all necessary supporting documentation is included). Once the financial analyst completes the review and follows up on any irregularities, the invoice is forwarded to the project manager for approval.

The project manager reviews the invoice or payment application in accordance with completed work or services and follows up with the vendor on any discrepancies. Once discrepancies are resolved, the project manager approves the invoice by initialing the proof of payment stamp and routes it back to the financial analyst for payment.

The accounting associate logs the project manager's approval into the DPM project management database and routes the approved invoice to the Controller's Office for payment.

LBRE's accounts payable supervisor produces a monthly Invoice Aging Report with a total for each school/department and a breakdown of outstanding invoices by project manager, invoice receipt date, vendor name, etc. Each project manager receives a copy of the report for his/her projects. Invoice aging status is reviewed at the monthly financial review meeting described in the next section.

LBRE Finance reviews a summary of all outstanding invoices, including a list of invoices outstanding for more than 60 days, the reason each invoice has not been paid or is on hold, and the action being taken to pay the vendor.

BUYOUT

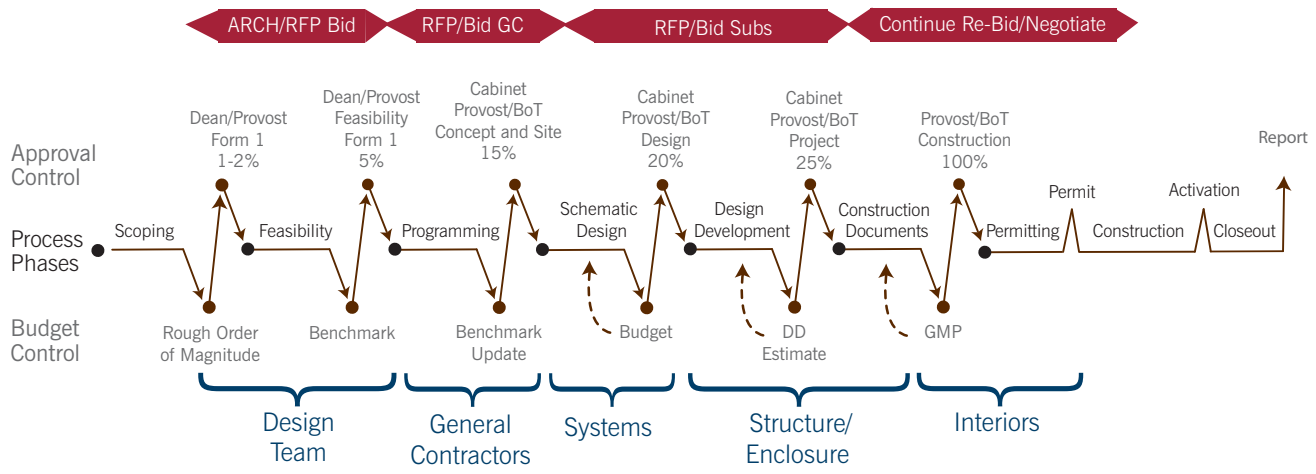
Stanford's buyout is designed to take advantage of team members' specific expertise; define and mitigate project risks early in the process; lock in pricing for major and key materials, equipment, and services; and respond to changing market conditions. The diagram below describes a progressive buyout related to process phases.

The project manager outlines a buyout strategy early in the project. Individual portions of the project are competitively bid throughout the Design phase, committing these portions of the scope and reducing overall project risk. Timing of these selections should be based on specific project risks and market conditions.

DPM employs a design/build delivery model for mechanical, electrical, plumbing, and sprinkler (MEPS) systems, exterior skin systems, and other trades as appropriate to bring a constructability focus to the design and to control the cost/performance of specific systems. The design/build engineers become the designers of record for that portion of the project and are responsible for delivering the quality and cost developed in schematic documents. The design consultants who prepared the SD documents may be engaged throughout the project for services such as peer review, energy modeling, or commissioning.

When schedule is a key project driver, DPM may undertake a "fast-track" delivery model. Fast-track projects assume that the project scope is packaged into separate permit submittals so that site work, structure, enclosure, and possibly core systems construction can begin while interiors are still in the Design phase. The progressive buyout approach supports fast-track delivery, though risks to the program and budget increase because the interior work must comply with the structure as it is built, rather than influence it. If the fast-track method is employed, special attention should be paid to contingency allocation.

PROGRESSIVE BUDGET PROCESS (FAST TRACK)



FINANCIAL REVIEWS AND REPORTING

Each project manager has a monthly financial review to monitor the status of his/her projects. Participants may include the DPM Director, the LBRE Finance Director, the financial analyst, and a Controller's Office representative.

The purpose of the review is to discuss the status of each project and assist the project manager in resolving outstanding issues. Information reviewed includes the summary risk/status report, the Project Status Report, and the Invoice Aging Report. The summary risk/status report includes current project status, financial status and budget log, schedule of milestones, risks to budget, risks to schedule, planned risk mitigation, Board of Trustees review dates, contract status, and contingency status. This information is documented in the LBRE financial database.

The financial analysts reconcile all commitments and expenditures between the LBRE financial database and Stanford's financial system to ensure accuracy. Discrepancies are investigated and resolved on a timely basis.

LBRE Finance also generates the following reports:

Monthly DPM Executive Summary to LBRE Senior Management

Project Status Report on all active DPM projects

LBRE Annual Report to Board of Trustees

BUDGET DEVELOPMENT

Developing and tracking the project budget is one of the project manager's key responsibilities. The project manager develops the budget in the Feasibility phase and refines it through succeeding phases. It is imperative that all elements of the budget are clearly defined, captured, and developed throughout each phase.

DPM uses custom software (Projecto) to create, develop, and monitor budgets. This program is linked to Stanford's accounting systems to track actual project commitments and expenditures. Project managers create budgets according to the categories below.

1. Construction
    a) Basic Construction (prime contractor's scope, including building, equipment in contract, site work, and construction escalation)
    b) Other Construction (hazardous materials, utilities, work orders, etc.)
2. Design Services
    a) Architectural Services
    b) Other Professional Services
3. Stanford Costs
    a) Stanford Costs (Stanford staff re-charge costs)
    b) Fixture, Furniture & Equipment (not in construction contract)
    c) Surge Costs
    d) Agency and External Fees (including permits, Below Market Rate Housing Tax [BMR], and Palo Alto Unified School District Impact Fee [PAUSD])
    e) Activation (moving, signage, telephone/data, etc.)
    f) Stanford Infrastructure Program
    g) General Use Permit Entitlement Fee
    h) Financing Costs
4. Project Contingency
5. Escalation Risk

Each of the process phases include budgets as a key deliverable and control point. The rough order-of-magnitude budget generated in the Scoping phase is based on a benchmark cost. Stanford maintains a database of completed projects, which is used in the Capital Plan to provide an early cost forecast. During the Feasibility phase, the project manager develops this benchmark budget based on specific project information. In the Programming phase, the benchmark budget is further developed to reflect more detailed project information.

At the end of Schematic Design, the project team is required to make value choices based on parameters including design, program, sustainability, and cost information in order to finalize the scope and budget. The Schematic Design BoT approval is the most important control point. Each of the user groups and vendors must understand and agree that the project scope is frozen at this point in the process.

At the end of Design Development, the project team must reconcile the Design Development estimate to the BoT approved Schematic Design budget. The arrows in the budget-control portion of the Heartbeat loop from the budget back into design, representing the time and effort that may be required to realign the DD scope of work with the approved budget. This realignment facilitates informed decision making among team members.

At the end of the Construction Documents phase and prior to a GMP, the project team must verify that the scope of work is aligned with the approved budget. Once the project receives Construction Approval, the GMP contract can be executed.

SPECIAL COST CONSIDERATIONS

Contingencies in the project budget represent the degree of risk within the estimate. Each budget carries a project contingency that represents risks in the completeness of the design, the degree of unknown conditions at the site, and other unknown areas such as professional fees, telecommunications, and hazardous materials. Contingencies may not be used to pay for scope additions or program changes requested by the project team, or university stakeholders. Project contingency funds must be authorized by the project manager prior to their commitment.

Field Allowance included in the contractor's GMP is for unforeseen conditions, jurisdictional requirements, and construction clarifications. The project manager must approve the use of field allowance.

Allowances are similar to contingencies in that they are intended to reserve funds for an event that is not clearly defined; they are thus more prevalent in the earlier Design phases, when project uncertainties are greatest. Unlike contingencies, however, allowances typically are identifiable single items or issues that are carried in budgets as line items. Allowances can also be carried by the general contractor (with the project manager's approval) within its budgets and estimates to cover identifiable items. Allowances within the general contractor's budgets should be minimal and not exceed 1 to 2% of the total contract. The project manager carries allowances in the project budget for construction and non-construction items as necessary.

Escalation Risk may be carried in the project budget during volatile construction markets in order to mitigate the risk of extraordinary material and labor escalation.

Stanford Infrastructure Program (SIP) provides funding for auxiliary projects that further develop the university's academic community and improve the university's physical plant. The infrastructure will be developed as necessary to improve public safety and service, and to promote conservation in land use and resources. A SIP assessment of 4.6% on all project costs applies to all capital projects (including new buildings, renovations, deferred maintenance projects, and the Capital Utilities Program) regardless of size, funding, and management. No assessments will be taken on projects funded through SIP or GUP Entitlement Fees. The SIP tax percentage may be reevaluated periodically.

General Use Permit Entitlement Fee (GUP) provides funding for the mitigation projects and programs required by Santa Clara County (Conditions of Approval) as a result of the December 2000 Community Plan and GUP approval. The required projects and programs include infrastructure and environmental resources studies, a comprehensive water conservation program, transportation demand management, habitat conservation, and consultant monitoring of mitigation compliance.

Additionally, the GUP Entitlement Fee will pay for the cost of roadway expansions, new parking, and expanded child care facilities to support a projected increase of students, faculty, and staff; the fee will be assessed on increases in school/department gross square footage. Housing units are required as a component of the GUP and are thus excluded from the GUP Entitlement Fee.

Below Market Rate Housing Fee (BMR) and **Palo Alto Unified School District Fee (PAUSD)** are assessed based on additional square footage, and paid to the Santa Clara County Office of Affordable Housing and Palo Alto Unified School District, respectively. These fees escalate yearly.

Financing Costs are a project responsibility for projects with debt funding or backstopping of gifts and/or department funds. The project is responsible for the cost of financing until the Temporary Certificate of Occupancy (TCO) or Substantial Completion; the school or department is responsible for the debt service once the TCO is received.

SCHEDULE DEVELOPMENT

The project schedule identifies and organizes project tasks into a sequence of events that form a project management plan. The process of building the schedule enables the project manager to identify risk points and understand the proper linkage of events; it also assists in resource planning and allows the project manager to establish milestones for the team and project.

The schedule is a tool that assists the PM in achieving a desired outcome, and it provides a means to measure team performance. A quality schedule includes control points that help to ensure project success. Specific control points that must be inserted and honored include, but are not limited to:

- Budget development and cost checks. This includes time to redesign in order to realign the scope with the budget (see the Heartbeat diagram on page 31)
- Stanford approvals (user group, Dean, Provost, Board of Trustees)
- Jurisdictional approval process

The overall project schedule should be the starting point for all projects at Stanford. The schedule is structured according to the process phases, but does not detail specific design and construction tasks for each phase; instead, it highlights the overall organization, logic, and control points.

Typical project durations from the start of programming through move-in are as follows. Actual duration are dependent on numerous variables unique to each project.

Sample Project Type	Typical Project Duration	Typical Construction Duration
Large science/medical project (> 25k gsf)	3–5 years	2–3 years
Large office/classroom project (> 25k gsf)	3–4 years	1–2 years
Large housing project (> 25k gsf)	2–3 years	1–2 years
Large renovation (> 25k gsf)	2–4 years	1–2 years
Small new buildings	2–3 years	1–1 1/2 years
Small renovations	varies	varies

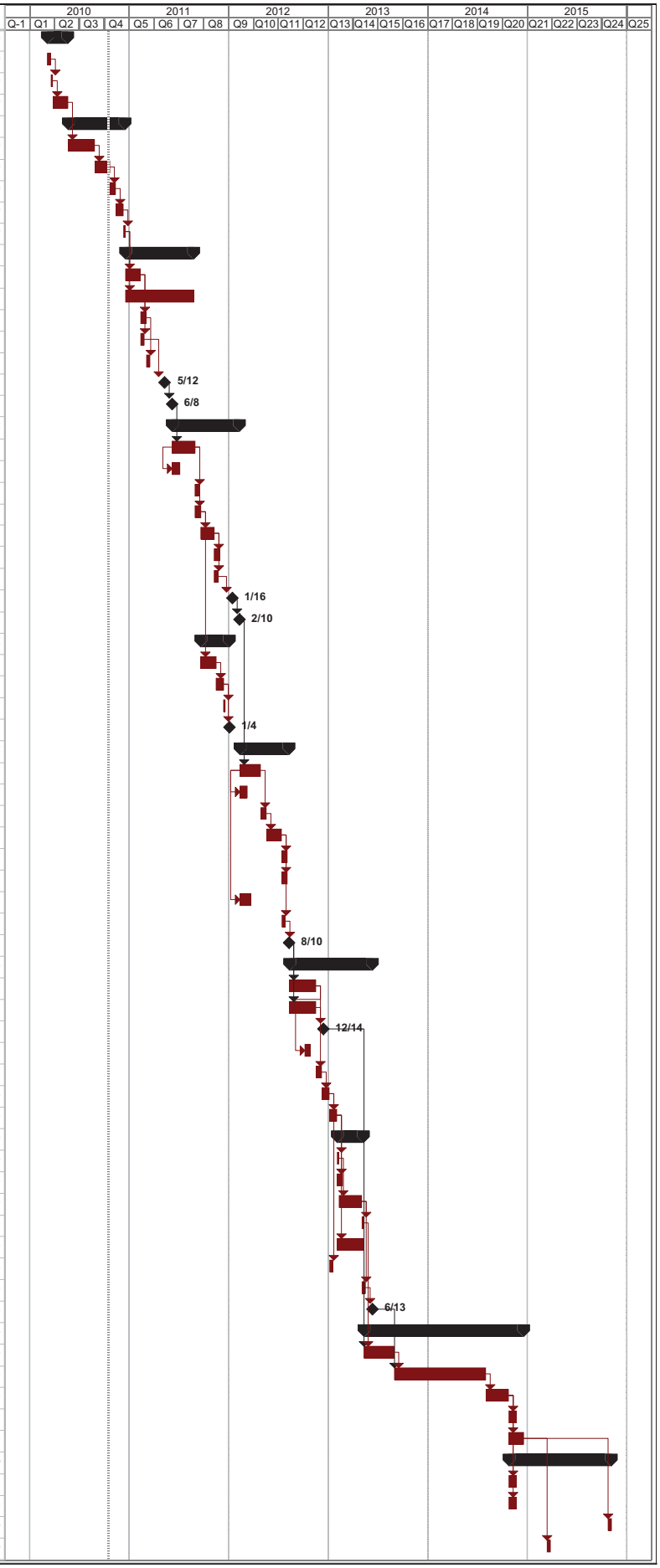
The project manager oversees the management schedule, which should be monitored and updated as the project moves through the design, agency approval, construction, and activation processes. The project manager can determine on a project-by-project basis which member of the project team is responsible for maintaining the project schedule.

The model schedule on the following page can be used as a template for Stanford projects. It outlines the DPM process and lists many project milestones, including BoT phases and Santa Clara County submittals.

The general contractor is responsible for developing and maintaining the detailed construction schedule.

SAMPLE SCHEDULE

ID	Task Name	Duration	Start	Finish
1	**Scoping Phase**	**55 days**	**3/8/10**	**5/21/10**
2	Form 1 Submittal by School/Department	10 days	3/8/10	3/19/10
3	Form 1 Approved	5 days	3/22/10	3/26/10
4	Scoping Meeting and follow-up tasks	40 days	3/29/10	5/21/10
5	**Feasibility Phase**	**150 days**	**5/24/10**	**12/17/10**
6	Select Design Team	70 days	5/24/10	8/27/10
7	Develop multiple options as appropriate	40 days	8/30/10	10/22/10
8	Budget Development level: Benchmark	15 days	10/25/10	11/12/10
9	Complete Feasibility Study; Select one Option	20 days	11/15/10	12/10/10
10	Revised Form 1	5 days	12/13/10	12/17/10
11	**Programming Phase**	**180 days**	**12/20/10**	**8/26/11**
12	Develop Program for approved Option	40 days	12/20/10	2/11/11
13	Identify/Implement applicable GUP special studies	180 days	12/20/10	8/26/11
14	Budget Development level: Updated Benchmark	15 days	2/14/11	3/4/11
15	Write-Up for Cabinet+ BoT Concept and Site Approval	10 days	2/14/11	2/25/11
16	Complete Funding Plan	10 days	3/7/11	3/18/11
17	University Cabinet meeting	0 days	5/12/11	5/12/11
18	BoT Concept and Site Approval	0 days	6/8/11	6/8/11
19	**Schematic Design Phase**	**177 days**	**6/9/11**	**2/10/12**
20	Develop design to Stanford SD level	60 days	6/9/11	8/31/11
21	Select General Contractor	20 days	6/9/11	7/6/11
22	Conduct Structural Peer Review	10 days	9/1/11	9/14/11
23	Budget Development level: Budget	15 days	9/1/11	9/21/11
24	Budget/Scope alignment (if necessary, allow 1-3 months)	35 days	9/22/11	11/9/11
25	User and Tech Team review (allow 2-4 weeks)	15 days	11/10/11	11/30/11
26	Write-Up for Cabinet+ BoT Design Approval	10 days	11/10/11	11/23/11
27	University Cabinet meeting	0 days	1/16/12	1/16/12
28	BoT Design Approval	0 days	2/10/12	2/10/12
29	**County ASA**	**75 days**	**9/22/11**	**1/4/12**
30	Submittal/determine complete/issue conditions of approval	40 days	9/22/11	11/16/11
31	County 20 day public notice and ASA Hearing	20 days	11/17/11	12/14/11
32	3 day rebuttal period	3 days	12/15/11	12/19/11
33	ASA Approval (15 days after hearing)	0 days	1/4/12	1/4/12
34	**Design Development Phase**	**130 days**	**2/13/12**	**8/10/12**
35	Develop design through Stanford DD level	55 days	2/13/12	4/27/12
36	Select Design/Build MEP Subcontractors	20 days	2/13/12	3/9/12
37	Budget Development level: DD Estimate	15 days	4/30/12	5/18/12
38	Budget/Scope alignment (if necessary, allow 1-3 months)	40 days	5/21/12	7/13/12
39	User and Tech Team review (allow 2-4 weeks)	15 days	7/16/12	8/3/12
40	Conduct Structural Peer Review	15 days	7/16/12	8/3/12
41	Incorporate ASA conditions in design (may add 1-3 months)	30 days	2/13/12	3/23/12
42	Write-Up for BoT Project Approval	10 days	7/16/12	7/27/12
43	BoT Project Approval	0 days	8/10/12	8/10/12
44	**Construction Documents**	**218 days**	**8/13/12**	**6/13/13**
45	Develop design to Stanford CD level	70 days	8/13/12	11/16/12
46	Permits for Demolition, Utilities, Haz Mat, Grading	70 days	8/13/12	11/16/12
47	BoT approval for partial construction (demo, utilities, grading)	0 days	12/14/12	12/14/12
48	Complete Structural Peer Review	15 days	10/8/12	10/26/12
49	Budget Development level: CD Estimate	15 days	11/19/12	12/7/12
50	Budget/Scope alignment (if necessary, allow 1-3 months)	20 days	12/10/12	1/4/13
51	User and Tech Team review (allow 2-4 weeks)	20 days	1/7/13	2/1/13
52	**Construction Permit Phase**	**70 days**	**2/4/13**	**5/10/13**
53	Submit drawings to appropriate jurisdictions)	5 days	2/4/13	2/8/13
54	Submit required ASA conditions of approval	15 days	2/4/13	2/22/13
55	Receive comments and submit revised set	60 days	2/11/13	5/3/13
56	Building Permit received	5 days	5/6/13	5/10/13
57	GC bids remaining trades	70 days	2/4/13	5/10/13
58	Complete Funding Agreement	10 days	1/7/13	1/18/13
59	Write-Up for BoT Construction Approval	10 days	5/6/13	5/17/13
60	BoT Construction Approval Approval	0 days	6/13/13	6/13/13
61	**Construction Phase**	**420 days**	**5/13/13**	**12/19/14**
62	Demo, sitework, utility work (if not completed during permit)	80 days	5/13/13	8/30/13
63	Building construction	240 days	9/2/13	8/1/14
64	Fit-up	60 days	8/4/14	10/24/14
65	Commissioning	20 days	10/27/14	11/21/14
66	Complete punch list	40 days	10/27/14	12/19/14
67	**Closeout Phase**	**270 days**	**10/27/14**	**11/6/15**
68	Building activation and move-in	20 days	10/27/14	11/21/14
69	Final commissioning/training/turnover	20 days	10/27/14	11/21/14
70	Post Occupancy Evaluation/ 11 month walkthrough	10 days	10/26/15	11/6/15
71	Financial closeout	10 days	3/16/15	3/27/15



COST ANALYSIS

The PM works with the Cost and Management Analysis department of the Office of Research Administration (ORA) to ensure that expenditures comply with government regulations. These regulations specifically relate to projects which have government grants that provide funds for research, and capital construction costs.

For facilities costing over $500,000, the university must prepare, prior to the acquisition or replacement of a facility, a lease-purchase analysis in accordance with OMB Circular A-21, section 26b(1). For more information on Circular A-21, see www.stanford.edu/dept/DoR/overview/circ_a21.html. The analysis must show that a financed purchase, including a capital lease, is less costly to the university than other operating lease alternatives on a net present value basis.

For debt arrangements over $1 million, unless the institution makes an initial equity contribution of 25% or more, ORA's cost and management analysis director should be contacted.

The table below shows required documentation to demonstrate reasonableness of facility cost for buildings with federal allocation.

Buildings over $10M with 40% federal allocation	Buildings over $25M with 50% federal allocation
Life cycle costs	Documentation of review steps performed to ensure that costs are reasonable
Environmental consideration	Comparison of project costs with relevant construction data
Unique research needs	
Federal construction code requirements	
Special building needs	
Competitive procurement practices	
Building site preparation	

SERVICE CENTER RULES

As a Service Center, DPM provides services to users within the Stanford community. DPM recovers the cost of operations through rate-basis charges to users and is subject to rules governing Service Centers. ORA has primary responsibility for monitoring compliance with university Service Center policies. Service Centers operate on a fiscal year break-even basis with rates based on budgeted projections of operating expenses (such as salaries, benefits, equipment, depreciation, materials, and supplies) and projected levels of activity provided during the budget period.

Li Ka Shing Center for Learning and Knowledge

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on pages: cover, 2, 9, 13, 17, and 29

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