Dear Colleagues,

The purpose of the Small Capital Project User Guide is to communicate the work processes and other important and relevant information needed to effectively complete small capital projects at Princeton University. Our goal is to provide a guidebook with key information and processes for our colleagues working on small capital projects and an understanding of the tools used by Facilities staff to guide the delivery of projects.

The first two sections of this handbook summarize how to start a small project, the makeup of a project team, project governance, and the difference between Tier 1 and Tier 2 projects. Please note assigning projects as Tier 1 or Tier 2 depends on both the complexity and potential cost of a project. The remainder of the handbook provides detail on Tier 1 projects, that follow three phases, and Tier 2 projects, that follow four phases.

We welcome your feedback as you complete project phases and projects.

Respectfully,

Kyujung Whang
Vice President for Facilities
Office of the Vice President for Facilities
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Cover image: 100 Overlook cafe, renovated in 2019
INTRODUCTION

Intended for campus user groups and project team members, this guide provides information on the processes, approvals, and project team roles involved in small capital projects which typically have a budget less than $7.5M.

The goals of its authors are to set expectations, share experiences, and facilitate communication among campus partners (leadership, Facilities, user groups, stakeholders and project team members).

Following the processes outlined in this guide helps to ensure our projects will:
- meet University objectives and guidelines
- attain sustainability goals
- satisfy user needs
- finish on budget and on schedule

Small capital projects are categorized into tiers, Tier 1 and Tier 2 projects, depending on cost and complexity. Projects are assessed individually to determine the appropriate tier. The project’s executive sponsor and the Office of Capital Projects (OCP) conduct the assessment to determine a project’s appropriate path.

The companion guide, the Capital Project User Guide, outlines the processes for capital projects which typically cost $7.5M and over, and require more approval levels. Occasionally, projects with a budget of less than $7.5M may be asked to follow the Capital Project User Guide if the complexity and/or visibility of the project necessitates additional checkpoints. The processes and approval levels outlined for your specific project are selected to ensure a successful outcome.

Princeton University’s Strategic Framework, approved by the trustees in 2016, identifies institutional priorities and emerging academic needs as they relate to the University’s core mission. The 2026 Campus Plan provides a framework to guide the evolution of our campus over the next 10 to 30 years. While the Strategic Framework and the Campus Plan directly apply to the planning of large capital projects, the same planning usually applies to small capital projects which often play a role in enabling or aiding the Campus Plan. Users (students, faculty, staff, and our larger University community) are critical participants in the success of all capital projects.

This Small Capital Project User Guide serves as a framework for small capital projects, helping users understand and move through essential checkpoints to complete their project. The guide is not, however, a step-by-step project manual. Project managers provide guidance throughout the project to ensure appropriate steps are taken, from helping to define the project scope to move-in activities. Our project managers look forward to working with you, the users, to design and build cost-effective facilities that meet your needs as well as contribute to the beauty of our campus.

This initial version of the guide describes how projects are managed by Facilities’ Office of Capital Projects (OCP). Other University groups also manage small capital projects, including University Services, Athletics, Facilities Engineering and Facilities Operations. The processes followed by these groups may differ from the processes outlined in this guide. Future versions of this guide will incorporate processes from the other departments.
GETTING STARTED

While larger capital projects originate from the University’s Strategic Plan and related Campus Plan, most small capital projects originate from a departmental or user need. A small capital project could be a need for new furniture, a lab renovation, a small building or something in between.

THREE STEPS TO BEGIN

1. Submit a Request Online
The first step in beginning a small capital project is to tell us about your need. We ask that you submit a New Capital Project Request form, on the Facilities website.

2. Requests Reviewed
The Vice Provost, in consultation with the Office of Capital Projects, reviews all small project/renovation requests on a weekly basis. You may be contacted if we have questions or seek clarity on your project goals.

3. Project Manager Assigned
If your project is approved to proceed for further study, a Facilities Project Manager (PM) (perhaps in conjunction with a representative from the Office of the University Architect) is assigned and will reach out to you to discuss your project in greater detail. Depending on the number of projects in progress and our resource capacity, please understand some approved projects may not start immediately.
Q & A

Q How can I pay for renovations or improvements?

A To pay for renovations you need either departmental funds, funding through various annual programs managed centrally, or a combination of both. As you consider your renovation needs, please research your funding options. After we have your request, and discussed the details with you, we will provide a cost range.

Below are potential funding sources, which are outlined in more detail on the Provost's website:

- **Provost Annual Program Fund**: Improvements to interior finishes, furniture and equipment required to accommodate program changes such as coursework, research direction, reorganizations.
- **Classroom and Teaching Lab Renovations**: Every fall, the Registrar distributes a request for project proposals to the academic departments.
- **Lab Renovations**: Lab renovations for new faculty or for new programs.
- **Capital Equipment Funds**: The need for new equipment purchases.
- **Public Space Furniture**: The need for refurbished or replacement furnishings in public areas.
- **Renovations Required for New Faculty**: New faculty member renovations for office space.
- **Major Maintenance**: Improvements to the structure, enclosure, mechanical and electrical systems, and interior finishes where the existing elements have been degraded due to time, weather, use, etc.

Q How do I determine a project’s cost?

A The New Capital Project Request form asks for your estimated budget, which could be your available funding or an estimate based on previous projects in which you were involved. In asking this we are looking for guidance on the project’s scope and potential cost. However, it is fine to leave this field blank if the cost is unknown. The PM assigned to work with you can provide estimates and cost ranges.

Q I don’t have any or enough departmental funding, how do I apply to funding programs?

A The PM assigned to your project can review the estimated cost and request central funding on your behalf with the Vice Provost for Space Programming and Planning (VPSPP). You may choose to discuss the project with the VPSPP directly, yet we encourage you to include the PM in these discussions in case technical questions emerge.

Q Why do projects take so long?

A Depending on the size and complexity, a project could take 4 months or 4 years. Below are some general guidelines to help set expectations, especially for projects that take longer than expected.

- New furniture can take up to 8 months due to production lead time as well as item research, vendor bidding, and item evaluation.
- Minor renovations that involve moving partitions, ceilings, and HVAC can take up to 8 months (or longer) due to permits and extensive systems work, including HVAC, electrical and lighting.
- Major renovations or a new building can take up to 4 or more years.
Q When should I submit my request if I need my project done by a certain time, or before the start of the next academic year?

A In our experience, renovation projects take more time than our users expect. One goal of this document is to give you the information you need to plan accordingly, and contact us with enough time to achieve your goals. Generally the earlier you can tell us about your need, the better.

Various factors lead to longer than expected timelines, especially when projects require permit approvals and long-lead time items such as lighting, HVAC and furniture.

**Summer projects should be submitted no later than early fall for complex projects and no later than early spring for simple projects.** Project requests submitted beyond March will likely be difficult, or impossible, to complete before the start of the next academic year.

Q What is the role of a Department Manager?

A The department manager or administrator plays an important role in maintaining progress on a project, as the liaison between the department and the PM, as well as coordinating services for the new or renovated space.

Typical responsibilities of a department manager on a small capital project include:

- state the department’s needs on many issues
- act as a filter and spokesperson for desired changes
- act as interface with faculty and/or staff on design issues
- serve as prime department contact regarding furniture selection
- help manage expectations of users with respect to budget, scope and schedule
- coordinates the review of drawings within user department during the review periods, and insures timely responses
- coordinates the removal of the occupants’ belongings in advance of the requested construction
- help determine storage location for equipment that needs to be saved for relocation
- assist in the development of temporary swing space options, if needed
- coordinate a move to, and back from, a temporary swing space, if needed
- assist in communicating construction impacts and outages to faculty and/or staff
- arrange installation of paper inserts into room signs in accordance with the Facilities Design Standards Manual (DSM)
- submit and coordinate requests for user and space services, such as...
  - with OIT for network configuration services
  - with OIT for telephone activation and provide list of user details
  - with Facilities for building, room and office door security
  - with Facilities for office equipment move arrangements.

McCosh lecture hall, renovated over the summers of 2019 and 2020.
PEOPLE AND PROCESSES

Accomplishing a small capital project requires a project team involved in the process from project inception to completion. Participants inform important aspects of a project, such as function, materials, building systems, safety elements, and operational aspects.

The participants in such an undertaking include entities that govern project decisions such as:

- outside architects and engineers
- user groups
- stakeholders
- other project team members as appropriate

In this section of the guide, the roles and responsibilities of each participant/project team member are broadly outlined. The roles will be described in more detail within each project phase.

Throughout the life of a project, participants will be engaged in an intensive, creative, collaborative process that will enable the project to develop into the best possible solution. During the project, clear communication is central to achieving success.

PRINCETON TEAM

Provost (Client)
The client for all capital projects, both large and small, is the provost.

The provost confirms the academic or operational need for a particular project, provides leadership and guidance during the project process, and appoints and coordinates with an executive sponsor. The provost manages approvals required by Facilities Planning Group (FPG), and approves documents that describe the project scope, budget, and project objectives, which are prepared by Facilities in collaboration with an executive sponsor. The provost may delegate the approval of the documents to the executive sponsor.

Executive Sponsor (ES)
The executive sponsor is a senior University administrator who...

- provides leadership to the project team, ensuring that project objectives, target costs/budgets, and the project time-line align with University goals;
- participates in the preparation of project documents (as required) for approval by the provost;
- leads funding discussions, coordinates with users, develops strategies, and provides direction on key issues, particularly those relating to program, cost, and schedule; and
- is accessible and approachable to the project team seeking guidance.

Vice Provost for Space Programming and Planning (VPSPP)
The Vice Provost for Space Programming and Planning is a senior University administrator who...

- depending on scale of project, assumes the role and responsibilities of the executive sponsor;
- assists the provost in managing the University’s space planning and programming agenda; and
- provides approval on projects with an anticipated project cost up to $250,000. Projects with multiple funding sources require FPG approval, which may take additional time.

“During the project, clear communication is central to achieving success.”
User Representatives
A user representative is a member of a school, college, or department, center or administrative unit responsible for the functional and operational requirements of a capital project, who...
- provides general and detailed project requirements and programming information to the project team;
- coordinates with the executive sponsor to establish a governance and communications plan with user groups; and
- facilitates clear and decisive communications with their user group.

A user representative, often a departmental manager or administrator, will be identified to represent all user groups.

For small projects, user representatives may be one or several individuals. To foster a clear understanding of project objectives and the capital project process, Facilities and the executive sponsor will advise users on project communication plans. Communications within user groups is discussed in more detail in the Communications section on page 12.

University Stakeholders
Subject matter experts within the University are the stakeholders responsible for reviewing project design at major milestones to ensure compliance with University standards, such as those of...
- Department of Public Safety;
- Environmental Health and Safety;
- Office of Community and Regional Affairs;
- System management (such as technology networks and building controls);
- and others.

Stakeholders may also include campus entities that may be affected by the construction of the project in some way. Facilities will coordinate and communicate closely with these stakeholders during all phases of the project.

FACILITIES TEAMS
Facilities represents the provost in leading the project through the design and construction process, ensuring that each project achieves project objectives, complies with University standards, and is designed and constructed within the approved budget and schedule.

Project Management Team
The Office of Capital Projects (OCP) manages the project in close collaboration with the Office of the University Architect (OUA) and other departments within Facilities. OCP and OUA collaborate closely, from project inception to closeout, with each group providing leadership in areas of responsibility throughout the duration of the project.

OUA is primarily responsible for alignment with the Campus Plan, architectural design, landscape design and storm water management.

OCP is primarily responsible for efficient communication with the project team, monitoring cost targets, anticipated costs, schedule, quality control, and compliance with municipal regulations.

OCP facilitates timely decision-making, reports on project cost and status, and prepares documentation on funding and other approvals for the VPSPP, executive sponsor, and provost.

OCP and OUA share responsibilities for project initiation, regulatory, zoning, and land use approvals.

Program Executive/Program Manager
The OCP program manager provides:
- leadership to the project manager and project team, particularly at project milestones and project completion;
- input to the project team on governance, resources, priorities, risks, and communication;
- liaison with the executive sponsor, users, and University administration; and
- monitoring of the plan for project governance, authorization, and approval.
Project Manager (PM)
The OCP project manager is:
- responsible for the day-to-day management of the project, including tracking project progress, team performance, and projected cost and quality; and
- the central point of contact for the project team.

Interiors Manager (IM)
The OCP IM manager:
- may be the primary project manager or may work with an OCP project manager
- will lead the design, documentation, and purchasing efforts, as they relate to interior layouts, furniture and related selections, and the installation efforts

Project Planner
The OUA project planner is the OUA point of contact to collaborate with the project team, providing guidance throughout all phases of the project. For small projects OCP will coordinate directly with the OUA. If any public space will be affected by a small project the OUA will be advised at the start of the Study Phase.

Field Manager (FM)
Depending on the nature of the project, an OCP field manager will be assigned to the project. The OCP field manager:
- partners with the PM early in the design phases and assumes increasing responsibilities as the project move through construction,
- provides support during the design and construction phases through constructibility analyses, site logistics planning, and schedule monitoring and reporting, and,
- has presence on site during construction and move-in, provides construction phase oversight of contractor procurement, project controls, change management, and commissioning and turnover to facility maintenance.

Facilities Departments
Subject matter experts within Facilities are responsible for reviewing project design at major milestones, to ensure compliance with University standards, as well as possibly participating in the construction work. Integral to the project team are:
- **Engineering and Campus Energy**, responsible for energy management on the campus, using best engineering practices to reduce energy use and environmental impacts;
- **Financial and Administrative Services**, which supports project financial management, procurement, and contracting needs;
- **Operations**, which provides input to confirm compliance with University standards, and to ensure durability and maintainability;
- **Office of Sustainability**, which oversees the University’s Sustainability Plan and coordinates with the project team to establish sustainability goals and review alignment of the project design with goals.

OUTSIDE TEAM MEMBERS

Design Professional
For some projects, the design professional, usually an architect leading a team of sub-consultants, will provide comprehensive services, including architectural, structural, mechanical, and electrical engineering and cost estimating services. This consultant is usually brought on board through a selection process during the project initiation phase, after the project scope, location, and target cost have been defined.

Builder
A builder, a construction manager (CM) or general contractor (GC), is engaged when appropriate for the project. Many projects will be bid among several builders after construction documentation is complete, depending on size and complexity of the project. For larger, more complex projects a CM may be engaged during the early design phase to provide cost estimates and related support. Depending on the project, Facilities’ trade shops may execute some or all of the construction.

Specialists
Depending on the specific programmatic and/or technical requirements for a particular project, other specialized consultants may join the project team, as needed. Some of these may be:
- acoustical engineers
- audio-visual consultants
- code compliance consultants
- cost estimators
- laboratory specialists
- landscape architects
Selecting Design Professionals

Not all small capital projects require the addition of outside design professionals. Princeton University’s Facilities has experienced project managers, architects, interior design professionals and craftspeople that can often complete small projects without the need of outside professionals. Your project manager will work with you to determine the appropriate mix of design professionals needed for your project.

If your project requires outside team members, the selection of design professionals is among the most important step in the beginning of a project.

Given the diverse building types and functions on Princeton’s campus, the University selects design professionals with deep experience in, and understanding of, the higher education environment, the specific programmatic requirements of the project, and the campus context. Facilities has a list of ‘on call’ design consulting firms which can be engaged for less complex projects.

When outside help is needed on complex projects, either the Office of the University Architect (OUA) or the Office of Capital Projects (OCP) initiates the selection process by identifying a list of design professional firms with appropriate experience and demonstrated ability to successfully collaborate. A list of firms receive a Request for Proposal (RFP) from Princeton University, which provides a general description of the project and the project definition document. Firms are asked to confirm their interest in the project and to respond with a written presentation of their qualifications and proposed fee.

After reviewing the submitted proposals and each firm’s experience and skill set, a meeting is convened with Facilities and key users where a short list of firms to be interviewed is recommended to the executive sponsor.

Interviews enable representatives from each firm to present their qualifications and approach to the project in person, while also giving Princeton University the opportunity to meet and interact with the designers and engineers with whom we will collaborate for the duration of the project.

58 Prospect Avenue, the Carl A. Fields Center for Equality and Cultural Understanding, with new wayfinding and chalkboard walls, renovated in 2009.
COMMUNICATIONS

The success of capital projects centers on clear, timely communication among users, leadership, stakeholders, Facilities, and external project team members. During project initiation, Facilities works with the executive sponsor and user representative to establish clear protocols:

- Identify who will be responsible for communications, input and decision-making;
- How information will be conveyed from front-line user groups to the project team; and
- How questions and clarifications of user needs will occur and be documented.

Ideally, one individual will be identified to represent each user group. This user representative will be responsible for gathering data and consensus from all user groups, and for forwarding the necessary information to the project team, ensuring that user interests are represented. This individual must be available to attend all regularly scheduled meetings.

While the individual users may need to interact directly with the design team from time to time, typically most user project requirements will be communicated through the user representative. A departmental manager or administrator often plays this role.

The pie chart diagram to the right shows the diverse types of project representatives that stay connected during a successful small capital project.

To promote clear communications and avoid potential delays to the project, the University will work with the design team and pre-construction manager (or construction manager, depending on the state of the project) in a highly-collaborative integrative design process (IDP). In this inclusive process, which includes broad representation of design disciplines as well as user groups, decisions can be influenced by a greater number of project participants, enabling optimally integrated solutions.

“A departmental manager often plays a key role in a small capital project, acting as the user representative, coordinating input and feedback from other users.”
GOVERNANCE

Timely decision-making on a project ensures that objectives, budgets and schedules are met. During the Project Initiation phase, the executive sponsor and Facilities establish a specific governance structure to help capital project users and other participants understand their roles and responsibilities and to enable project decision making.

A general governance structure is outlined below:

**Executive Sponsor** meetings (for projects that have an executive sponsor) occur only as needed for the executive sponsor to ensure that the project is in compliance with the project objectives, and to possibly recommend approval or input by the provost at certain project milestones.

The **Building Committee**, which includes user and stakeholder representatives, and the Princeton project team, provides detailed program requirements and recommendations to the project team in compliance with the value proposition, project objectives and target cost/budget. This group will define decision points for elevation to the executive sponsor.

Members: user representative or leadership, Facilities project team members, Facilities stakeholders (e.g., Engineering and Campus Energy, Operations, Sustainability)

Frequency: Every two weeks, but may vary

The **Project Team** is responsible for the day-to-day management of the project to ensure that it achieves the preliminary project objectives, satisfies the program requirements and meets the established target cost/budget and schedule. This group organizes agendas and prepares materials for all meeting and workshops, and works closely with the building committee to secure detailed project requirements and determine decision points.

Members: user representative, project manager, program manager, project planner, external consultants (e.g., the architect, engineers and builder)

Frequency: Weekly, but may vary
**CAPITAL APPROVAL LEVELS**

Capital projects involve significant investments in time and money, and accordingly require oversight and approvals. The Vice Provost for Space Planning and Programming (VPSPP) and the executive sponsor play central roles in project approvals.

Small capital projects can occur in two categories, Tier 1 and Tier 2, with slightly different processes, project team members and approval levels. The Tier 1 and Tier 2 sections of this guide provide greater detail on the processes and approvals needed, by phase, for each project category.

The VPSPP, the Project Manager, and/or the executive sponsor will establish the category and related processes during the Project Initiation phase based on project size, projected cost, complexity and visibility. The charts on this page provide general guidelines on the two tiers of small capital projects, including the approving groups and financial authority levels.

**PROJECT CATEGORIES**

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<th>Category</th>
<th>Approving Group</th>
<th>Description</th>
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<tr>
<td><strong>Tier 1</strong></td>
<td><strong>Vice Provost for Space Planning and Programming</strong></td>
<td>Tier 1 projects are small interior renovations, usually limited to finishes, furnishings and minor architectural, electrical and mechanical alterations. Projects with limited scope may be designed and documented by Facilities, and constructed with internal facilities mechanics or &quot;on-call&quot; builders. More complex projects with partition changes that involve new systems, lighting and ceilings (often with a cost over $100,000), require engaging an architect or engineer for design and documentation, including submitting code reviews and permits. The Vice Provost for Space Planning and Programming (VPSPP) approves Tier I projects. The VPSPP also approves studies up to $250,000 for larger projects. If a project is below $5,000 and funding is provided by a department, provost approval is usually not required.</td>
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<td><strong>Small Capital Project</strong></td>
<td><strong>Facilities Planning Group (FPG)</strong></td>
<td>Tier 2 capital projects are more complex, ranging from larger renovations to new buildings or structures. Often multi-room renovations and lab renovations fall into this category; however, a highly visible small project less than $250,000 may also fall into this category. A consulting architect or engineer is engaged to design and document the project. The Facilities Planning Group (FPG) approves Tier 2 capital projects. FPG includes the provost, executive vice president, VP for Facilities, University architect, treasurer, other representatives from Facilities, University advancement, and government and community affairs. The FPG meets monthly, therefore project requests that require FPG approval will incorporate the FPG schedule into the project schedule accordingly.</td>
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**SMALL PROJECT PROCESSES**

Before a small capital project begins, the VPSPP and/or the Facilities Project team identifies it as either a Tier 1 or Tier 2 project. Different factors are used to determine this categorization and the decision is always based on which path is best for a successful outcome.

The chart below provides an overview of Tier 1 and Tier 2 small capital projects phases. Depending on a project’s characteristics, elements of some phases may be combined. Further detailed processes and approvals are described in later sections of this document.

While both tiers have a similar project delivery method, smaller Tier 1 projects are generally faster-paced projects requiring less design, approvals and documentation.

Tier 2 projects spend more time in the initial project initiation phase and overall benefit from...

- more detailed documentation
- more milestones to confirm costs & budgets
- more formal project initiation and formulation
- more time and help to set requirements and discover programming needs
- FPG approvals

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<td>Confirm the project need; establish a target cost and project objectives</td>
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<tr>
<td>Study Phase</td>
<td>Study Phase</td>
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<tr>
<td>Initiation/Programming/Concept</td>
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<tr>
<td>Establish project objectives; Conceptualize and define the project with enough detail to select a final design and budget</td>
<td>Design the project in a level of detail appropriate for project and bid the project to builders/vendors</td>
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* Tier 1 projects are typically those with a simple scope and an evident design solution
* Tier 2 projects are typically those with a complex scope and a to-be-determined design solution
Estimating Renovation Costs

Facilities will present options to establish an appropriate target cost for a new project by understanding your goals and researching similar projects.

The construction cost target established for the project does not include “soft costs” or non-construction related costs, such as design fees, permits, and furniture. For budgeting purposes, a project multiplier is added to the construction cost target to cover these soft costs which then generates the target project budget.

During the project design, Facilities prepares estimates to confirm that the project cost still falls within or below the target project budget, usually at these milestones:

- during the Study Phase, at the end of Programming/Concept
- during the Study Phase, at the end of Schematic Design
- during the Authorization Phase, at 100% completion of Construction Documentation

*smaller projects typically have a cost estimate, or contractor bid, done only at the completion of construction documents.

The PM will determine the frequency of estimates during project initiation. Project teams prepare an independent estimate to confirm the cost. A second estimate by a construction manager (CM) or general contractor (GC) is required for larger projects, which will be reconciled with the other cost estimate(s) in a collaborative manner.

If the estimated cost exceeds the target project budget, the project team and Facilities will lead an inclusive process, with the VPSPP, user and stakeholder input, to recommend changes to the design (a step sometimes called value engineering), incorporating less costly alternative materials or design solutions in order to preserve the functional project objectives within budget. If these measures do not result in bringing the estimated cost within or below the cost target budget, the project will need to be redesigned to meet the budget. These proposed changes may require modifying the project objectives, which will be reviewed and approved by the VPSPP and executive sponsor.

Once Facilities confirms that the cost reductions have reduced the cost estimate to meet the project budget, the design team is directed to continue to the next phase.

McCosh Walk looking east toward Robertson Hall, renovated in 2017.
TIER 1 SMALL PROJECTS

THREE-PHASE PROJECT DELIVERY

- Study Phase
- Authorization Phase
- Approval Phase

Tier 1 projects cost up to $250,000, can take up to 12 months after initiation (or longer depending on project parameters), and move through three phases of University governance. Each phase requires a great deal of communication and collaboration among members of the project team and the University.

Typically Tier 1 projects have two design sub-phases, as opposed to Tier 2 projects that have three. The chart below provides an overview of what to expect and this section provides details on each of the three phases.

<table>
<thead>
<tr>
<th>Study Phase</th>
<th>up to 3 months*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation/Programming/Concept</td>
<td>Schematic Design (SD)</td>
</tr>
<tr>
<td>Establish project objectives; Conceptualize and define the project with enough detail to select a final design and budget</td>
<td></td>
</tr>
</tbody>
</table>

- Assign Facilities staff
- Confirm need, project type, size, function, and location with users
- Governance through the Provost’s office, Vice Provost for Space Programming and Planning
- Hire design Professional, if needed
- Document program and create conceptual design options
- Identify regulatory requirements and risks
- Develop sustainable goals and strategy
- Conduct design reviews
- Select preferred option
- Review furniture layout and products
- Set target project budget, identify funding source and secure approval of funds if required
- Set baseline project schedule

<table>
<thead>
<tr>
<th>Authorization Phase</th>
<th>up to 4 months*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Documentation (CD)</td>
<td></td>
</tr>
<tr>
<td>Design the project in a level of detail appropriate for project and bid the project to builders/vendors</td>
<td></td>
</tr>
</tbody>
</table>

- Create required detailed documentation
- Satisfy regulatory requirements
- Confirm selected furnishings and finishes and complete design
- Conduct design reviews
- Secure contractor pricing
- Confirm construction cost is within project budget
- Confirm project budget
- Begin regulatory submission process
- Secure approval of funds
- Order furniture
- Finalize furniture selections and order
- Review and update schedule

<table>
<thead>
<tr>
<th>Approval Phase</th>
<th>up to 6 months*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction/Move-In</td>
<td></td>
</tr>
<tr>
<td>Build the project, move in and evaluate the project success</td>
<td></td>
</tr>
</tbody>
</table>

- Prepare construction site
- Construct the project
- Create move-in plan
- Confirm systems operational
- Install furniture
- Occupants move in
- Measure move in
- Gather lessons learned

* Projects vary widely in the time it takes for governance, design, vendors, permits, construction and move-in. After OCP meets with a user representative to discuss the project a draft timeline can be created.
OVERVIEW/GOALS

Confirm the project need.
Conceptualize and define the project with enough detail to select a final design and budget.

Before the start of a Tier 1 study phase, the Vice Provost of Space Programming and Planning (VPSPP), with input from the user representative and Facilities, will confirm a project can move into the study phase.

Tier 1 Study Phase Goals

- Identify key objectives that deliver an end result that fulfills the project’s overall goal
- Identify Facilities team
- Establish project type, function and approximate size
- Confirm target budget and funding strategy
- Select design professionals, if required
- Develop detailed program that defines the needs and relationships among the spaces
- Examine and document space layouts and options and cost projections
- Assess and confirm project systems, such as HVAC, electrical, technology, and envelope
- Assess and confirm operations and maintenance needs
- Document preferred option in schematic design
- Confirm cost is within target cost
- Set baseline project schedule
- Set project budget
- Authorize additional documentation funding, if required
- No significant changes made after this phase

DETAILS

Initiation
The Study Phase begins with defining the project functional goals, project size, location, target budget, and baseline schedule. The VPSPP is the executive sponsor and the provost’s representative. Facilities assigns representatives to support the project throughout its duration.

With guidance from the VPSPP and input from the user, Facilities reviews and documents the following elements: Purpose, Project Goals/Objectives, Governance, Users/Key Stakeholders, Constraints/Risks, Target Budget if known, Source of Funding, Estimated Duration, Success Criteria.

A funding strategy, including potential gifts and related time line, will also be examined in parallel with the project.

Some projects will require study to determine the target cost range, which can occur using either an in-house Facilities PM or, for more complex projects, engaging an external design professional. When funding is required for a design professional, the VPSPP will need to endorse and approve the project so the Study Phase can begin.

The target cost represents the construction cost. A target project budget, which includes the target cost and non-related costs such as fees, permits and furniture, can be established using a project multiplier or by estimating these costs.

Many small capital projects do not require an outside design professional. If your project will require the selection of a design professional, that will be determined at the beginning of the study phase.

“The focus of Study Phase is to create the project scope, while verifying the conceptual project aligns with University priorities and resources are available as needed.”
Programming/Concept

The Programming/Concept sub-phase happens in two parts: first the Programming and then Concept Design, one right after the other. For small Tier 1 projects the PM may advise that the Programming/Concept phase is not required, and the project can proceed directly to Schematic Design.

When needed, Programming is a critically important phase of the project, essential for a successful design. The elements of the program can include:

- the functional needs and relationships
- building system requirements
- sustainability goals (energy, water, storm water)
- environmental requirements
- existing conditions survey
- renovation feasibility
- preliminary schedule
- zoning requirements

During Concept Design, Facilities and/or the design professional will lead the user in a review of options, outlining advantages and disadvantages of different design concepts. User input provides direction to refine the options and work toward a final range of preferred design options, which will continue to be developed in more detail.

Sustainability goals are considered and set with the building committee. Projects are required to meet the University's Design Standards, including Stormwater Management guidelines. These goals continue to be reviewed and measured through the project development process.

Schematic Design (SD)

Schematic Design adds details to the project, documenting:

- general building materials
- general furniture products and finish selections
- building systems such as lighting, HVAC and technology

The user and Facilities provide guidance that is critical at this phase of the design, to refine the project requirements and to verify that the project objectives and university guidelines are satisfied.

An assessment of increased operations and maintenance (O&M) costs for a project begins in this phase. The project manager opens discussions with the user and university services providers such as Facilities, Department of Public Safety and University Services to compile O&M types and approximate costs for items like energy use, building custodial costs, or special security needs.

At the end of Schematic Design, the projected cost is confirmed to fall within the target cost, the project budget is established, the schedule is reviewed and updated as necessary, and the project objectives are verified that they have been met. If additional funding for construction documentation is required the VPSPP will review the project for authorization to proceed with the understanding that no significant changes are to be made in the subsequent design and documentation phases.

GOVERNANCE APPROVALS

Tier 1 projects require the following approvals from the VPSPP during this phase:

- Project Objectives approved
- Target Cost and Target Project Budget identified
- Program and preferred concept layout option approved
- Schematic Design approved
- Projected operations and maintenance costs endorsed
- Baseline schedule approved
- Project Budget approved

USER INVOLVEMENT

Programming through Schematic Design, are the phases in which user leadership and user groups are the most engaged with the project, providing important direction on program, layout, priorities, and details of the project requirements as they are being incorporated into the design.
OVERVIEW / GOALS

Design the project in progressive levels of detail and contract with a builder.

Tier 1 Authorization Phase Goals

- Complete design and construction documentation and technical specifications to construct project
- Project materials, building systems and elements are refined and confirmed
- Include strategies to achieve sustainability goals
- Confirm projected operations and maintenance costs
- Confirm project objectives are met
- Solicit bids from selected suppliers, facilities shops or general contractors
- Confirm bids are within the project budget
- Review and update project schedule

DETAILS

Construction Documentation (CD)

Facilities staff or design professional works with users and Facilities to continue refining and developing the project design documentation in sufficient detail for trade contractors to construct the project. These documents, both drawings and text documents, describe the following in general terms:

- exterior envelope design, including roof, wall sections, windows, foundations alterations
- structural systems modifications
- interior circulation, corridors, stairs, doors
- functional partition layouts with materials generally identified
- building systems including lighting, HVAC, and electrical
- interior finishes
- final furniture selection
- Technology selections and placement

During this phase, overall user input is often reduced since the project requirements are outlined in the documentation. However, furniture layout, design and selection will still require significant user input.

At the end of the Authorization Phase, Facilities leads the project through a review of the design documents with users and stakeholders, called Tech Reviews, referencing project user requirements and University Design Standards Manual guidelines. Based on feedback, the documents are updated and cost estimates are prepared, or sent out to contractors for bidding.

The Project Manager will engage with the user and university service providers at the end of this phase to confirm operations and maintenance costs, that were obtained in schematic design, which will be reviewed and approved by the Provost Budget Group.

Once the drawings are complete, final construction costs will be obtained either through a bidding process with general contractors or with university vendors or facilities shops.
Furniture is usually ordered during this phase to ensure it will arrive when construction is complete.

The construction costs are used by Facilities to prepare the final funding and approval request in the Approval Phase to construct and move into the facility.

This request is reviewed and approved by the VPSPP. Once this approval is obtained, the project moves into the approval phase where the team prepares permit documentation, secures municipal approval and permits, and begins construction.

GOVERNANCE APPROVALS

Tier I projects require the following approval from the VPSPP during this phase:

- confirmation that the documentation meets project objectives
- confirmation that the projected cost is within budget
- approval of projected operations and maintenance costs
- authorization of final funding to proceed to the Approval Phase; construction and move-in

USER INVOLVEMENT

Overall user input usually diminishes in the Authorization phase, focused on providing input on furniture selection and input on the drawings to ensure that the design meets the project requirements. Furniture is designed and selected during this phase. Some highly technical projects, including laboratories, do require a continuing high level of user input in this phase.

If changes are contemplated that may affect the project objectives, either to keep the project within the authorized budget, or for another reason, Facilities will review these proposed modifications in detail with users.

Furniture selections are finalized so the product can be bid, if required, and ordered.

Jadwin Hall, renovated in 2008.
OVERVIEW / GOALS

Build the project, move in, and evaluate its success.

Tier 1 Approval Phase Goals
• Monitor and report on construction progress
• Ensure that construction quality meets University standards
• Monitor testing, commissioning and acceptance of building systems
• Develop and implement a move-in plan
• Monitor delivery and installation of furniture and equipment
• Gather user and stakeholder feedback

DETAILS

Construction
Prior to construction, if a site logistic plan is required, Facilities reviews and approves the builder’s proposed site logistics plan, which outlines barriers that will isolate the site from the campus for safety reasons. The plan shows how material will be delivered, disruptions to traffic (pedestrian and vehicular), locations of items such as cranes, pathways for vehicles to enter and leave the site as well as contractor access within existing buildings. Permits and other approvals are secured by the project team.

Facilities, continuing in its central role to track construction progress and monitor quality, will:
• schedule periodic meetings to review progress, issues, and quality control
• monitor the submittal process, where each element of the project goes through a technical review process with Facilities Tech Team to ensure that project requirements are met and University standards are followed
• monitor progress on the project site
• monitor costs to ensure that costs are within project budget
• communicate periodically with VPSPP, users, and stakeholders on progress and adherence to project delivery plan
• track quality control by ensuring that inspections occur as construction progresses
• ensure that systems are inspected and tested through a commissioning process
• track and coordinate the order and delivery of furniture

Well before construction nears completion, Facilities will work with stakeholders to develop a plan, if testing is required, for portions of the work and acceptance of the renovation area. In this process, called commissioning, steps are taken to test the function of equipment and systems prior to accepting the project as complete.

“Quality control is applied through a detailed submittal process, where each element of the design is confirmed by the design team, Facilities, and stakeholders to ensure compliance with project requirements and University standards.”
If required on a Tier 1 project, a move-in plan will be created with user input to ensure a smooth transition for users and stakeholders who will now occupy and operate the new facility. The move-in plan provides for occupant belongings, materials, and any special equipment to be relocated in an organized, safe manner.

**Move-In**
When required, the move-in plan developed during construction is implemented, including moving items and equipment into the building and ensuring that the building is tested, accepted by the University, and operational. Facilities also assists in training the users and stakeholders in operating the building systems, including HVAC, lighting, and other special systems such as security.

When post-move-in questions or issues emerge, Facilities will continue to be the contact for correcting conditions or responding to issues.

After move-in, Facilities solicits feedback from the users and stakeholders on the project delivery process and how successfully the project satisfied objectives. We will be asking questions such as:

- Does the project satisfy the project objectives as outlined and tracked through the overall process?
- Does the project meet the needs of users?
- Does the project function as anticipated?
- Was the process to design and build the project well-organized?
- Was communication during the project effective?
- Were users and stakeholders supported in understanding the project process?

Responses may be solicited through online surveys and/or interviews. This critical feedback is used by Facilities and leadership to continue improving how Facilities delivers projects.

**GOVERNANCE APPROVALS**
Tier 1 projects require the following approval from the VPSPP during this phase:

- project objectives confirmed

**USER INVOLVEMENT**
User input is important to establish and implement the move-in plan, and to provide feedback after move-in.

“A move-in plan is established to ensure a smooth transition into the building.”
Selecting Furniture

Furniture plays a critical role in a renovation project, in terms of how it functions, how durable it is and how its design complements the project objectives. Occupants of a finished space interact closely with its furnishings, in both spatial and tactile ways, so the successful outcome of a project depends on thoughtful and deliberate selection of furniture pieces.

What is often a surprise to users is furniture can often take 3 to 4 months to deliver after an order is placed. This long lead time is often what dictates a timeline for small projects that involve new furniture.

The University strives to create appropriately designed spaces that satisfy project objectives while also promoting a consistent application of furniture design solutions. As a general rule, furniture solutions are designed to establish thoughtful, functional and flexible standards for the building, and not selected for individual styles.

During the Study Phase, Facilities interiors team members consider the functional furniture objectives for each space in the Programming/Concept sub-phase and the actual layout and preliminary product selection of furniture begins in the Schematic Design sub-phase. The sizes and arrangements of furniture are confirmed to ensure that each space functions well and complies with codes relating to egress and accessibility. Cost assumptions are made using knowledge of the industry and then reviewed with users at the end of the Study Phase.

In the Authorization Phase, project designers select all of the building materials including walls, ceilings, and flooring. Furniture options are also proposed by the designers and reviewed by users and project stakeholders for function, fit, and aesthetics. Facilities will confirm that the proposed selections meet applicable codes and University standards for durability, and are within the allocated budget.

Multiple furniture manufacturers will be considered and maybe asked to bid, and products are often tested by the project team and users to ensure that the most appropriate pieces or systems are selected. Facilities will coordinate the selection and the final user reviews of the proposed furniture.

Furnishings for the Joseph Henry House renovation, above, retains a traditional style for the faculty and staff centered space.

Furniture and custom wall treatments for the Fields Center renovation, above, provides color and comfort for the student-centered space.
**Tier 2 Small Projects**

**Four-Phase Project Delivery**

- **Project Initiation Phase**
- **Study Phase**
- **Authorization Phase**
- **Approval Phase**

Tier 2 projects cost between $250,000 and $7,500,000 and move through four phases of University Governance. Each phase requires a great deal of communication and collaboration among members of the project team and the University.

The chart below provides an overview of what to expect and this section provides details on each of the four phases.

<table>
<thead>
<tr>
<th>Project Initiation</th>
<th>Study Phase</th>
<th>Authorization Phase</th>
<th>Approval Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 3 months*</td>
<td>up to 8 months*</td>
<td>up to 12 months*</td>
<td>up to 24 months*</td>
</tr>
</tbody>
</table>

**Project Initiation**
- Confirm the project need; establish a target cost, value proposition, and preliminary project objectives
  - Assign Facilities staff
  - Confirm need, project type, size, function, and location
  - Identify executive sponsor and staff
  - Create Project Definition Document
  - Establish target cost and funding strategy
  - Establish governance and communications
  - Select design professional(s)
  - Confirm funding source
  - Set baseline project schedule

**Study Phase**
- Conceptualize and define the project with enough detail to select a final design and budget
  - Engage users
  - Document program
  - Create conceptual design layout options and cost estimates
  - Develop sustainability goals and strategies
  - Identify regulatory requirements and risks
  - Refine project definition document
  - Conduct design reviews and sustainability charrette
  - Select preferred option
  - Develop preferred option by adding systems and general materials
  - Engage a builder
  - Confirm cost is within target cost
  - Review furniture and finish options
  - Set project budget
  - Review and update schedule

**Authorization Phase**
- Design the project in progressive levels of detail and contract with a builder
  - Continue to develop design by adding details to materials and building systems
  - Confirm construction cost is within project budget
  - Create detailed documentation
  - Satisfy regulatory requirements
  - Select furnishings and confirm finishes
  - Conduct design reviews
  - Secure contractor pricing
  - Begin regulatory submission process
  - Confirm sustainability goals are met
  - Confirm project budget
  - Review and update schedule

**Approval Phase**
- Build the project, move in and evaluate the project success
  - Prepare construction site
  - Order furniture
  - Construct the project
  - Create move-in plan
  - Confirm systems operational
  - Occupants move in
  - Measure project objectives
  - Gather lessons learned

*Projects vary widely in the time it takes for governance, design, vendors, permits, construction and move-in. After OCP meets with a user representative to discuss the project a draft timeline can be created.*
The focus of the Project Initiation Phase is on creating a critical scope document, called a Project Definition Document, while verifying the conceptual project aligns with University priorities, available resources, and the Campus Plan.
Facilities will also work with the executive sponsor and user to establish a governance structure and a communications plan, which are outlined in detail in the “Project Team” and “Process” sections of this Small Capital Project User Guide. A funding strategy, including potential gifts and related timeline, will also be examined in parallel and incorporated into the document.

The Project Definition Document continues to be refined throughout the Project Initiation Phase. This is an iterative process that is informed by re-examining original assumptions. For example, Facilities will recommend options to establish an appropriate target cost by researching similar projects, and may engage cost estimators specializing in a particular building type.

The target construction cost represents the construction cost. A target project cost, which includes the target cost and non-related costs such as fees, permits and furniture, is also established using a project multiplier.

At the end of this phase, prior to the selection of a design professional, the Project Definition Document is finalized and approved by the executive sponsor and provost. The contents of the Project Definition document are integral in the criteria for selecting an architect.

Once the design professional is selected, Facilities drafts funding request documents for study funding so the architect can begin working. Once endorsed and recommended by the executive sponsor, the provost and the Facilities Planning Group approve the funding so the Study Phase can begin.

GOVERNANCE APPROVALS

The Project Initiation Phase requires approval by the provost’s office, to ensure the project is appropriately defined and cost-targeted correctly from the beginning.

Once endorsed and recommended by the executive sponsor of the Facilities Planning Group (FPG) or the VPSPP, depending on the cost of the initial study budget, the Study Phase can begin.

USER INVOLVEMENT

During the Project Initiation Phase users provide input outlining the academic or operational need and general project requirements, including function, size, location, operational objectives, and the building occupants.

These requirements will be reviewed in greater detail in the Study Phase.

“A Sustainability Charrette is where the project team, users, stakeholders and sustainability experts meet and review possible sustainability strategies in detail.”
OVERVIEW / GOALS

Conceptualize and define the project with enough detail to select a final design and budget.

Facilities and the design professionals, usually an architect, will lead a process involving users to develop a detailed program, a document that defines the functional needs, relationships among the spaces, and other specific details about the project. Once the program is approved, the architect will develop design concepts, or layouts, for review with users and stakeholders. Once a final concept is selected the project will proceed to the schematic design phase.

Tier 2 Study Phase Goals

- Develop detailed program
- Examine and document space layouts and options
- Define project systems, such as HVAC, electrical and envelope
- Assess operations and maintenance needs
- Engage construction manager
- Develop related costs for layout options
- Select preferred option
- Document preferred option in schematic design, including project systems, furniture, and sustainability strategies
- Confirm cost is within target
- Confirm impact of the project on operations and maintenance
- Refine project definition document
- Set project budget
- Review and update project schedule
- Determine swing space needs, if any
- No significant changes made after this phase

DETAILS

Programming/Concept

The Programming/Concept sub-phase happens in two parts: first the Programming and then Concept Design, one right after the other.

Programming is the process of systematically collecting, documenting and communicating the detailed criteria for the expected performance of the facility and site. Programming is a critically important phase of the project, essential for a successful design. The elements of the program can include:

- the functional needs and relationships
- building system requirements
- sustainability goals (energy, water, storm water)
- environmental requirements
- campus planning requirements
- zoning requirements

During Concept Design, Facilities and the design professional will lead the user and executive sponsor in a review of options, outlining advantages and disadvantages of different design concepts. User input provides direction for the architect to refine the options and work toward a final range of preferred design options, which will continue to be developed in more detail.

Sustainability goals are considered and set during this phase. These goals continue to be reviewed and measured through the project development process.

This integrative design process continues, along with assessments of each option’s building systems and related cost estimates. Concept design options meeting the target budget will be presented to the executive sponsor and the provost’s office. A funding strategy, possibly requiring fundraising goals to be met, will be confirmed prior to proceeding to the next phase.

“Programming is the process of systematically collecting, documenting and communicating the detailed criteria for the expected performance of the facility. The programming effort will reflect the project objectives.”
GOVERNANCE APPROVALS

Tier 2 projects require the following approvals from the governing committee during this phase:

- program and preferred concept layout option approved
- Schematic Design approved
- refined Project Definition Document approved
- fundraising goals met, if required
- projected operations and maintenance costs endorsed
- target project budget approved by Facilities Planning Group (FPG)

USER INVOLVEMENT

The Study Phase, Programming through Schematic Design, is the one in which user leadership and user groups are the most engaged with the project, providing important direction on program, layout, priorities, and details of the project requirements as they are being incorporated into the design.

Schematic Design (SD)

Once the approval for the preferred option is received the project proceeds to Schematic Design, adding details to the project and documenting:

- site strategies
- functional relationships and building organization
- sustainability strategies, including stormwater management, where applicable
- building form
- general materials
- the building systems such as exterior envelope and HVAC defined
- Furniture layouts

The user, the executive sponsor, and Facilities all provide guidance that is critical at this phase of the design, to refine the project requirements and to verify that the project objectives and University guidelines are satisfied.

A builder, or construction manager, is engaged as part of the project team to provide input on the design and related cost.

An assessment of the changes to operations and maintenance (O&M) costs for a project begins in this phase. The project manager opens discussions with the user and university services providers such as Facilities, Department of Public Safety and University Services to compile O&M types and preliminary costs for items like energy use, building custodial costs, or special security needs. At the end of this phase these preliminary costs are reviewed and endorsed by the Provost Budget Group.

At the end of Schematic Design, the projected cost is confirmed to fall within the target cost, the budget is established, and the Project Definition Document is refined to reflect any adjustments to project objectives or project scope. Once these documents are approved by key project stakeholders, the FPG reviews the project scope and target project cost. If the FPG is satisfied, they recommend the project to continue into the next phase, with the understanding that no significant changes are to be made in the subsequent design and documentation phases.
OVERVIEW

*Design the project in progressive levels of detail and confirm target project costs.*

During the Authorization Phase, the design professionals focus on documenting the approved Schematic Design, and continues to develop drawings and documents that describe the project in increasing detail.

**Tier 2 Authorization Phase Goals**

- Complete design and construction documentation and technical specifications to construct project
- Project materials, building systems and elements are refined and confirmed
- Include strategies to achieve sustainability goals
- Confirm projected operations and maintenance costs
- Confirm estimated cost is within target project budget
- Confirm project definition document is met
- Develop and finalize CM’s Guaranteed Maximum Price (GMP) or bid out and award to a general contractor
- Begin permits and regulatory approval requests
- Update project schedule as needed

DETAILS

**Design Development (DD)**

The design professionals work intensively with users and Facilities to continue refining and developing the project design documentation. These documents, both drawings and text documents, describe the following in general terms:

- exterior envelope design, including roof, wall sections, windows, foundations
- structural systems; foundations and building super-structure
- interior circulation, corridors, stairs, doors
- functional partition layouts with materials generally identified
- building systems including lighting, HVAC, electrical in diagrammatic and outline form
- site and utility work, including stormwater management
- interior finishes
- furniture layout and design (furniture selection begins)

At the end of the Design Development sub-phase, Facilities leads the design professionals through a review of the design documents with users and stakeholders, called Tech Team Reviews, referencing project user requirements and University Design Standards Manual Guidelines. Based on feedback, the documents are updated and cost estimates prepared.

During design development, Facilities will also begin a regulatory submission process relating to zoning and land use, if required for the project. Furniture layout, design and selection will continue with significant user input during this phase. Once the cost is confirmed to be within the target project budget, Construction Documentation can proceed.
Construction Documentation (CD)
In this sub-phase, the design professionals document the building in sufficient detail for trade contractors to construct the project, adding dimensions and details such as structural reinforcement and HVAC system elements such as ductwork. Many project teams use a 3-D technology, known as Building Information Modeling (BIM), to design the building in “real space,” enabling a thorough review of spatial relationships to ensure that the building can be built with a minimum amount of changes and efficiently maintained by Facilities and others.

Tech Team Reviews, Drawing Reviews and cost checks occur in this phase, at the 50% completion and 85% completion stages, to confirm that the estimated costs are within the project budget.

The Project Manager will engage with the user and university service providers at the end of this phase to confirm operations and maintenance costs, which will be reviewed and approved by the Provost Budget Group.

Once the drawings reach level of completion where the project can be bid, it is either bid to a group of general contractors or the construction manager prepares a Guaranteed Maximum Price (GMP) based primarily on a competitive selection of trade contractors.

The GMP (or bid) is used by Facilities to prepare the final funding and approval request in the Approval Phase. This request is reviewed by the executive sponsor, and approved by FPG. Once this approval is obtained, municipal approval and permits are secured and the construction of the project commences.

GOVERNANCE APPROVALS
Tier 2 projects require the following approvals from the governing committee during this phase:

- confirm project objectives
- Design Documentation approved
- confirmation at regular intervals that the projected cost is within target project budget
- approval of projected operations and maintenance costs
- approval of final funding by FPG for project to proceed to the Approval Phase

USER INVOLVEMENT
Overall user input usually diminishes in the Design Development sub-phase, focused on providing input on furniture selection and input on the drawings to ensure that the design meets the project requirements. Some highly technical projects, including laboratories, do require continuing high level of user input in Design Development.

In the Construction Documentation sub-phase, user input is also typically reduced, since the design professional’s team is focused on describing the project in detail, documenting decisions made in previous phases. While reviews occur, they are limited to confirming that the design is tracking to earlier parameters. If changes are contemplated that may affect the project goals, either to keep the project within the authorized budget, or for another reason, Facilities will review these proposed modifications in detail with users.
OVERVIEW / GOALS

Build the project, move in, and evaluate its success.

Construction phase activities are closely monitored by Facilities, which continues to track progress against the detailed construction schedule.

Tier 2 Approval Phase Goals

- Monitor construction progress with schedule
- Provide timely reports of activities
- Ensure that construction quality meets University standards, as detailed in the Princeton University Facilities Department Design Standards Manual (DSM)
- Monitor testing, commissioning and acceptance of building systems
- Develop and implement a move-in plan
- Monitor delivery and installation of furniture and equipment
- Gather user and stakeholder feedback after move-in

DETAILS

Construction

Prior to construction, Facilities approves the builder’s site logistics plan, which outlines barriers that will isolate the site from the campus for safety reasons. The plan shows how material will be delivered, disruptions to nearby traffic (pedestrian and vehicular), and locations of other items such as cranes and pathways for vehicles to enter and leave the site. Permits and other approvals are secured by the project team.

Facilities, continuing in its central role to track construction progress and monitor quality, will:

- schedule periodic meetings to review progress, issues, and quality control
- monitor the submittal process, where each element of the project goes through a technical review process with Facilities Tech Team to ensure that project requirements are met and University standards are followed
- monitor progress on the project site
- monitor projected costs to ensure that costs are within project budget
- communicate periodically with executive sponsor, users, stakeholders on progress and adherence to project delivery plan
- track quality control by ensuring that inspections occur as construction progresses
- ensure that systems are inspected and tested through commissioning process
- oversee final selection, procurement, and delivery of furniture

Well before construction nears completion, Facilities will work with stakeholders to develop a plan to test and accept the building. In this process, called commissioning, steps are taken to test the function of equipment and systems prior to accepting the project as complete.

“Construction phase activities are closely monitored by Facilities, which continues to track progress against the detailed construction schedule.”
A detailed move-in plan will be created with user input to ensure a smooth transition for users and stakeholders who will now occupy and operate the new facility. The move-in plan provides for occupant belongings, materials, and any special equipment to be relocated in an organized, safe manner. Facilities hires movers (including specialized equipment movers) and assists users to develop a plan for packing and unpacking.

**Move-In**

The move-in plan developed during construction is implemented, including moving items and equipment into the building and ensuring that the building is tested, accepted by the University, and operational. Facilities also assists in training the users and stakeholders in operating the building systems, including HVAC, lighting, and other special systems such as security.

When post-move-in questions or issues emerge, Facilities will continue to be the contact for correcting conditions or responding to issues.

After move-in, Facilities solicits feedback from the users and stakeholders on the project delivery process and how successfully the project satisfied objectives. We will be asking questions such as:

- Does the project satisfy the project objectives as outlined and tracked through the overall process?
- Does the project meet the needs of users?
- Does the project function as anticipated?
- Was the process to design and build the project well-organized?
- Was communication during the project effective?
- Were users and stakeholders supported in understanding the project process?

Responses may be solicited through online surveys and/or interviews. This critical feedback is used by Facilities and leadership to continue improving how Princeton projects are delivered.

**GOVERNANCE APPROVALS**

Tier 2 projects require the following approval from the governing committee during this phase:

- project objectives confirmed

**USER INVOLVEMENT**

User input is important to finalize furniture selection, establish and implement the move-in plan, and to provide feedback after move-in.
GLOSSARY

A/E  Architect/Engineer consultant
AIA  American Institute of Architects
CA  The abbreviation for Construction Administration, which occurs in the construction phase
CD  Construction Documents
CM  Construction Manager
CM/GC  Construction Manager/General Contractor
CMAR  Construction Manager at Risk
CMU  Concrete Masonry Unit, concrete blocks used in construction
CO  Change Order
CPM  Critical Path Method
DD  Design Development
DSM  Design Standards Manual
ES  Executive Sponsor
FF&E  Furnishings, Fixtures, and Equipment
FPG  Facilities Planning Group
G&B  Grounds and Buildings Committee
GC/CM  General Contractor/Construction Manager
GMP  Guaranteed Maximum Price
GSF  Gross Square Feet
HVAC  Heating, Ventilation, Air-Conditioning, the mechanical systems of a building
LEED  Leadership in Energy and Environmental Design
NASF  Net Assignable Square Feet
NSF  Net Square Feet
NTP  Notice to Proceed
OCP  Office of Capital Projects
OUA  Office of the University Architect
PACA  President's Advisory Committee on Architecture
PCO  Potential Change Order
PE  Program Executive
PM  Project Manager
PP  Project Planner
PPO  Preliminary Project Objectives
PrM  Program Manager
RFI  Request for Information
RFP  Request for Proposals
RFQ  Request for Qualifications
SD  Schematic Design
SOQ  Statement of Qualifications
UBC  Uniform Building Code
USGBC  United States Green Building Council
VE  Value Engineering
VP  Value Proposition
VPSPP  Vice Provost for Space Planning and Programming

Additional Services  Services provided by an A/E consultant that are not included in “Basic Services,” which may be performed by the A/E as part of the Contract only if and to the extent specifically authorized by Princeton University in writing.

Allowance  A dollar amount allocated to cover the cost of items of work that are of indefinite scope or quantity, or where the quality, configuration or other characteristics have not yet been determined. Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site, less applicable trade discounts, together with all costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses.

Alternate Project Components  desired by the owner but not included in the base bid. If the bids are lower than the budget, these alternative items may be added to the bid proposal.

Approval (Princeton Governance)  The approval of a small capital project by the VPSPP and/or the Facilities Planning Group is needed at the end of the Authorization Phase to proceed with construction, based on a final design and an approved project budget.

Approval Phase  The final phase of a small capital project, after the Authorization Phase, includes sub-phases Construction and Move-In.

Architect-Engineer (A/E)  The term “Architect-Engineer” aggregates to all of the architects and engineers in the employ of the Architect-Engineer, as well as Basic Subconsultants and Specialized Subconsultants separately engaged by the Architect-Engineer in the performance of this Contract.

As-Built Drawings  Drawings, prepared by the contractors, which accurately reflect what was constructed, including field verification.
Authorization (Princeton Governance)
The authorization of a small capital project by the VPSP and/or the Facilities Planning Group is needed at the end of the Study Phase (Schematic Design) to continue with design documentation, based on the schematic design and the project budget.

Authorization Phase  The second or third phase of a small capital project, after the Study Phase, includes the sub-phases Design Development and Construction Documentation.

Base Bid  The competitive bid submitted by a contractor for base scope of a project. The apparent low base bid is not necessarily accepted until an analysis of add alternates and deduct alternates are included in the comparison.

Basic Services  Consulting architectural and engineering services from programming through construction and acceptance, provided by the architect, or principal consultant, including architectural, structural, mechanical, and electrical engineering and cost estimating services for a project.

Basic Subconsultants  The Subconsultants retained by the Architect-Engineer for the performance of structural, mechanical, and electrical engineering services, cost estimating and specification writing services for the Project.

Benchmarking  A measurement and analysis process that compares practices, processes, and relevant measures to those of a selected basis of comparison (i.e., the benchmark) with the goal of improving performance. Princeton will often employ a benchmarking process to examine quantitative and qualitative aspects of projects on or off campus to inform the target cost or schedule for planned capital projects.

Beneficial Occupancy  Use of a building, structure, or facility by the owner for its intended purpose (functionally complete), although other contract work, nonessential to the function, remains to be completed.

Bid Package  Drawings, specifications, instructions to bidders and other related documents necessary to solicit competitive bids for a scope of work.

Bidding  The process of soliciting and collecting competitive bids from contractors.

Budget  A planned allocation of financial resources to apply towards a proposed project or scope of work often including separate line items for discreet areas of work or effort.

Budget Contingency  A line item and amount in a budget to allow for items, conditions, or events for which the occurrence is uncertain, but that experience shows will likely result in additional costs. Typically estimated using statistical analysis or judgment based on past project experience. Contingency excludes major scope changes and extraordinary events such as major strikes or natural disasters.

Budget Estimate  An estimate generally prepared to form the basis for authorization and/or appropriation of funds.

Budgeting  The process by which financial resources are applied to one or numerous projects or areas of work.

Building Efficiency Ratio  The ratio of net square feet to gross square feet. Often expressed as a percentage. The formula is: NSF/GSF x 100 = Building Efficiency.

Capital Plan  A listing of potential university projects approved by the trustees along with the related financial allocation. Projects in the capital plan are still subject to processes and approvals outlined in this guide.

Capital Project  For the purpose of this guide, a Princeton University Capital Project is one managed by Facilities’ Office of Capital Projects.

Casework  The built-in cabinets, shelving, and counters that are part of a project.

Code  General term which includes all municipal, state, and national building and life safety codes that pertain to a project.

Change Order (CO)  Written authorization from a building owner or the owner's agent to a contractor to change the scope of work, design, materials used, or equipment installed.

Chiller  The piece of HVAC equipment that chills the water used to cool a building. Chillers are fueled by electricity, gas, or steam.

Commissioning  The process for achieving, verifying, and documenting that the performance of a building and its systems meets design intent as well as the owner and occupant's operational needs. The process extends through all phases of a project, from initial concept to occupancy and operations, and includes the training of maintenance personnel. May include performance tests on mechanical equipment, water washing, flushing and drying of equipment and piping, control systems operability checks, checking of safety and fire protection devices, and operation of systems. Commissioning normally follows mechanical completion and ends with initial operation or startup.
Conceptual Estimate  An estimate generally prepared based on very limited information.

Construction Administration  The administration by the owner, or the owner's representative (typically the architect), of the construction phase of a capital project.

Construction Budget  A financial allocation established by Princeton University for the construction of the project, including trade subcontractors, contractor's general conditions (staff, site requirements, etc.), design and construction contingencies, insurance, bonds (if any) and the contractor's fee. The construction budget is set at the end of the Schematic Design sub-phase. The A/E shall design the project so that the construction cost does not exceed the construction budget.

Construction Contingency  That portion of the construction cost that may be reserved to cover increased or added costs resulting from circumstances that may not be completely predictable or foreseeable at the time that the Guaranteed Maximum Price (GMP) is established but that can reasonably be assumed to be included within the scope of work for the project and presumed to have been included in but was omitted from the GMP.

Construction Cost  The total actual or estimated cost of all elements of the project designed or specified by the A/E, including trade subcontractors, contractor's general conditions (staff, site requirements, etc.), design and construction contingencies, insurance, bonds (if any) and the construction contractor's fee. Construction cost does not include the compensation of the A/E, the costs of the land, rights-of-way, financing and other non-construction expenses.

Construction Documents  The construction drawings, specifications, general conditions, supplementary general conditions, special conditions, addenda, and electronic submittals developed to set forth in detail all aspects of design, function and construction and that will be used for estimating the cost of the project, securing bids for constructing the project, and directing a contractor in construction of the project. The Construction Documents will enable the contractor to carry out the project.

Construction Manager (CM)  A broad term covering a variety of project delivery scenarios in which a construction manager is engaged to oversee scheduling, cost control, constructibility, project management bidding or negotiating construction contracts, and construction. Princeton utilizes several contract methods to engage a CM, depending on the project requirements, such as GMP (Guaranteed Maximum Price) and CPFF (Cost plus a fixed fee).

Construction Schedule  The schedule for the construction of the project, prepared by the Contractor during the Design Development Phase.

Contract  An agreement between Princeton University and an architect, contractor or some other suppliers creating mutual obligations enforceable by law. The basic elements required for the agreement to be a legally enforceable contract are: mutual assent, expressed by a valid offer and acceptance; adequate consideration; capacity; and legality.

Contract Documents  The documents that compromise the Contract, including the construction documents, as more fully set forth in the Contract.

Contract Time  The period of time established in the contract within which the work must be substantially completed. The contract time can be adjusted only by change order.

Contractor  The prime general contractor performing the construction work on the project, or the contractor retained by the university to provide pre-construction services. Sometimes used interchangeably with CM.

Cost Estimate  A compilation of all the probable costs of the elements of a project or effort included within agreed-upon scope. Note: Cost estimates for smaller projects may not be as detailed or rigorous as the Cost Estimate Classification System described below.

Cost Estimate Classification System  There are numerous characteristics that can be used to categorize project cost estimate types. Some of these characteristics are: level of project definition, end usage of the estimate, estimating methodology, and the effort and time needed to prepare the estimate. The American Association of Cost Engineers (AACE) recommends that the primary characteristic used to define the classification category is the level of the project. The other characteristics are considered secondary. The level of project definition defines maturity, or the extent and types of input information available to the estimating process. Such inputs include project scope definition, requirements documents, specifications, project plans, drawings, calculations, lessons learned from past projects, reconnaissance data, and other deliverables and information that must be developed to define the project. Each industry will have a typical set of designing deliverables that are used to support the type of estimates used in that industry. The set of deliverables becomes more definitive and complete as the level of project definition (e.g., project engineering) progresses. For projects, the estimate class designations that follow below are labeled Class 1, 2, 3, 4, and 5. A Class 5 estimate is based upon
the lowest level of project definition, and a Class 1 estimate is closest to the full project definition and maturity. This “countdown” approach considers that estimating is a process whereby successive estimates are prepared until a final estimate closes the process.

**Cost Estimate Classification System, Class 5 Estimate** (Typical Level of project definition required: > 0% to 2% of full project definition.) Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some organizations have elected to determine that due to inherent inaccuracies, such estimates cannot be classified in a conventional and systematic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with little effort expended. Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.

**Cost Estimate Classification System, Class 4 Estimate** (Typical Level of project definition required: 1% to 15% of full project definition.) Class 4 estimates are generally prepared based on limited information, and subsequently have fairly wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary (but generally not final) budget approval. Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to the next stage.

**Cost Estimate Classification System, Class 3 Estimate** (Typical Level of project definition required: 10% to 40% of full project definition.) Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation and/or funding. Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase “control estimate” against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate may be the last estimate required and could well form the only basis for cost/schedule control.

**Cost Estimate Classification System, Class 2 Estimate** (Typical Level of project definition required: 30% to 75% of full project definition.) Class 2 estimates are generally prepared to form detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the “bid” estimate to establish contract value.

**Cost Estimate Classification System, Class 1 Estimate** (Typical Level of project definition required: 65% to 100% of full project definition.) Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to compromise a fair price estimate to compare against a contractor’s or vendor’s bid estimate, or to evaluate dispute claims or change orders.

**Cost Estimating** The predictive process used to quantify, cost, and price the resource required by the scope of an investment option, activity, or project. Cost estimating is a process used to predict uncertain future costs. In that regard, a goal of cost estimating is to minimize the uncertainty of the estimate given the level and quality of scope definition. The outcome of cost estimating ideally includes both an expected cost and a probabilistic cost distribution. As a predictive process, historical reference cost data (where applicable) improve the reliability of cost estimating. Cost estimating, by providing the basis for budgets, also shares a goal with cost control of maximizing the probability of the actual cost outcome being the same as predicted.

**Critical Path Method (CPM)** A step-by-step methodology, technique or algorithm for planning projects that involve complex, interdependent interactions. It identifies critical and not-critical paths to prevent conflicts and bottlenecks.

**Deduct Alternates** Project components that are desired by the owner but could be removed from the base bid if the bids exceed the budget.

**Design-Bid-Build** The traditional method of project delivery, in which the owner commissions an architect or engineer to prepare drawings and specifications under a design services contract, which are put out to bid, after which the owner separately contracts with a contractor for construction.
**Design-Build** A project delivery method in which the client contracts with a single entity to provide both design and construction services. The design-build entity may be a single firm, a consortium, or a joint venture assembled for the project.

**Design Concepts** A design option or idea, usually early in the concept phase, that provides adequate information to determine if a concept is worth pursuing. An idea for a solution to a client/owner’s architectural problem.

**Design Development Phase** The first sub-phase of Princeton’s Authorization Phase, the Design Development phase is focused on identifying and verifying technical solutions to meet requirements of the schematic design, approved at the end of the Study Phase.

**Design Development Documents** Plans, outline specifications and related documents developed from the Schematic Design Documents in greater detail to confirm or adjust, as required, all aspects of the schematic plans such as exterior design, mechanical and electrical systems, structural systems, area arrangement, foundation plans, etc., and to facilitate revised cost information to be prepared to reflect the more detailed development.

**Design Documents** Collectively the Schematic Design Documents, the Design Development Documents and the Construction Documents, prepared by the A/E.

**Design Review** A formal, documented, comprehensive and systematic examination of a design to evaluate design requirements and capability of the design to meet these requirement and to identify problems and propose solutions.

**Design Schedule** The detailed schedule for the design phases of the project that includes milestones for design and approvals.

**Design Standards Manual (DSM)** An online resource for the architect that specifies requirements and processes relating to anticipated quality of building materials, systems and operational objectives. These requirements, once incorporated into the documents by the A/E, will be reflected in the construction documentation for installation during the construction phase.

**Escalation** A budget allowance that may be created for uncertain changes in economic market conditions over time. Inflation (or deflation) is a component of escalation.

**Estimate** A prediction or forecast of the resources (i.e., time, cost, materials, etc.) required to achieve or obtain and agreed upon scope (i.e., for an investment, activity, project, etc.) See also Cost Estimate.

**Estimate to Complete (ETC)** The expected cost to finish all the remaining project work.

**Executive Sponsor** A Princeton senior university official assigned by the provost to a project during the project initiation phase. The executive sponsor provides leadership to the project team, ensuring that project objectives, cost ranges and project timeline are met. The executive sponsor leads funding discussions, develops strategies on key decision points, and participates in the creation and approval of project documents by the provost.

**Facilities Planning Group (FPG)** The university committee responsible for review and approval of capital projects with authority up to $7.5M. FPG also recommends trustee approval for projects over $7.5M. Chaired by the provost with other University leadership and facilities representatives.

**Fast Track** A process in which certain design activities overlap with construction activities in order to expedite the owner's completion or occupancy of the project.

**Feasibility Study** A study performed to determine if a project is financially, physically, and legally possible.

**Fixed Fee** The architect-engineer’s fixed price compensation for the performance of its basic services and those of its basic sub-consultants. The fixed fee does not include compensation for reimbursable expenses or specialized sub-consultants.

**Furnishings, Fixtures, and Equipment (FFE)** The furnishings, blinds, carpets, shelves, (sometimes) casework, movable lighting, and other equipment that is not hard-wired or hard-plumbed into a building.

**General Conditions** The general costs for a general contractor or construction manager including costs for material and labor for supervision, administration, clean up, protection, and related costs.

**General Contractor (GC)** A firm that performs the work under contract all by itself, or through the use of subcontractors whose activities it supervises and coordinates, or a combination of the two.

**General Terms and Conditions** General definition of the legal relationships and responsibilities of the parties to the contract and how the contract is to be administered.
Gross Square Feet (GSF) All of the floor space inside a building, measured from the outside surfaces of exterior walls.

Guaranteed Maximum Price (GMP) The maximum amount payable to the contractor for the performance of the work under a GMP contract.

Historical Database Records accumulating past project experience stored as data for use in planning, estimating, forecasting and predicting future events. Often includes data that has been processed so as to facilitate planning and other purpose such as validation and benchmarking (e.g., metrics, etc.)


LEED Process to achieve certification for sustainability achievements in building design and construction governed through the USGBC (United States Green Building Council). The Leadership in Energy and Environment Design (LEED) is based on a points system, which includes levels such as silver, gold and platinum, and requires technical submittals and reviews to assure compliance with goals.

Legal Requirements Any and all requirements of law, code, permit, regulation, rule, order, judgment, decree, ordinance, or provision of any federal, state, or local government agency, authority, or court pertaining to (i) the contract, or (ii) the work undertaken by the contractor pursuant to the contract.

Life Cycle The stages or phases that occur during the lifetime of an object or endeavor. In a life cycle cost or investment analysis, the life cycle is the length of time over which an investment is analyzed (i.e., study period).

Life Cycle Cost The sum of initial costs and operating, maintenance and replacement costs, less salvage value, over the life of the facility.

Life Cycle Cost (LCC) Method A technique of economic evaluation that sums over a given study period the costs of initial investing (less resale value), replacements, operations (including energy use), and maintenance and repair of an investment decision (expressed in present or annual value terms).

Material Testing The verification of the quality and quantity of materials used in construction, usually performed by a third-party testing firm under the supervision of the owner.

Net Assignable Square Feet (NASF) The Net Square Feet that can be specifically assigned to users.

Net Square Feet (NSF) The net floor space in a building measured from the inside surfaces of exterior walls and excluding interior walls, partitions, mechanical equipment rooms, lavatories, janitorial closets, elevators, stairways, major circulation corridors, aisles, and elevator lobbies.

Notice to Proceed (NTP) The official notification by the owner to a consultant or contractor that work on the project can begin.

Not-to-Exceed Price (NTE) The maximum amount payable to the contractor for the performance of the work under a time-and-materials contract. The maximum compensation to the Architect-Engineer for basic services, which is comprised of the fixed fee, the specialized sub-consultants NTE amount, and the reimbursable expense NTE amount.

Open Shop An employment or project condition where either union or non-union contractors or individuals may be working.

Owner Often confused with “user” or “client,” the “owner” is the entity that officially owns and/or operates a completed capital project. For Princeton, the owner is the Board of Trustees.

Planning A general term to examine the preliminary arrangement of spaces or functions, which can occur at the campus level, or the building or space level.

Post-Occupancy Evaluation Evaluations that focus on the satisfaction and behavior of a project users or project participants.

Pre-Design The phase of the project where the services provided by an A/E could include Feasibility studies, master planning, programming, the concept design, and research for a design project.
**Preliminary Project Objectives (PPOs)** Key project objectives which are set in the Project Initiation Phase that will lead to success in achieving the value proposition. PPOs may include objectives for: functionality, teaching, research, collaboration, flexibility, character of space, sustainability, durability and operations.

**Prime Consultant** The consultant, most often an architect, who takes the lead on a project team. Depending on the type of project, the prime consultant could also be a landscape architect or an engineer.

**Prime Contractor** Also known as the general contractor, or construction manager.

**Princeton University** The term “Princeton University” means The Trustees of Princeton University, the owner of the project, acting through its Princeton University representatives.

**Principal Architect** Usually the highest-ranking member of the A/E firm on the design team. Often the individual responsible for major design direction.

**Programming/Concept Phase** During the Programming/Concept sub-phase, which is the first sub-phase in Princeton's Study Phase, facilities and the design team will lead a process involving users to develop a detailed program, a document that defines the functional needs, relationships and details about the project. Conceptual design options will be created depicting the functional needs and outlining pros and cons of each option examining function and cost. Eventually one final option is approved to proceed in further design during the schematic design phase.

**Programming** A process of systematically collecting, documenting and communicating the detailed criteria for the proposed performance of the facility and site. It may include the functional needs and relationships, building system requirements, and other parameters such as sustainability, planning and zoning criteria.

**Project Architect** The architectural consultant responsible for managing the design effort on a project.

**Project Budget** The total budget required to build and occupy a facility, composed of the construction budget and allowances to provide for design fees, furniture, equipment, permits, contingency and other costs not directly associated with construction.

**Project Definition Document** A document created in the Project Initiation Phase which includes the value proposition, preliminary project objectives, and other project parameters such as location and target cost.

**Project Initiation Phase** The first major phase of a Princeton capital project where Project Definition Documents and related project documents are created and approved.

**Project Manager (PM)** A representative of Princeton's Office of Capital Projects (OCP), who is assigned during the Project Initiation Phase. The project manager is responsible for the day-to-day management of the project, for instance tracking project progress, team performance and projected cost and quality. The PM is the central point of contact for users, stakeholders and consultants.

**Project Planner** A representative of Princeton's Office of the University Architect, who is assigned to a project in the Project Implementation Phase to provide guidance throughout the project to ensure alignment with the Campus Plan and University aesthetic goals.

**Project Schedule** The work product of a planning process that identifies the duration and interdependent relationships of all activities that influence the progress of a project. This schedule is to be developed and maintained in a format and level of detail necessary to support critical path method (CPM) analysis. Princeton University typically develops a conceptual-level planning version of a project schedule which is used to determine the milestone design schedule dates. This same work product becomes the project schedule and will incorporate the design schedule and the construction schedule. The contractor will assume responsibility for maintaining project schedule during the preconstruction phase.

**Proposal** The submittal prepared in response to an owner's request for proposals (RFP).

**Proprietary Specification** When an owner or architect specifies a particular brand of equipment or technique in the construction documents. A proprietary specification prohibits the contractor from using any other brand or manufacturer's product.

**Punch List** The punch list itemizes work that must be completed or issues that must be resolved by the contractor or vendor (FFE). This list is prepared by the responsible A/E for the project, and can include tasks as minimal as touching up the paint on a wall or as major as troubleshooting an HVAC system that isn't functioning as designed.

**Record Drawings** Final construction drawings and documentation, prepared by the architect its sub-consultants, which include significant changes made during the course of the project.
**Reimbursable Expenses** Permitted expenses incurred by the architect and its sub-consultants in the performance of basic services. These often include travel and lodging expenses, printing and copying costs, postage, etc.

**Request for Information (RFI)** A request from a contractor or vendor (FFE) to the architect or owner for a clarification of intent or understanding in the construction documents.

**Request for Proposals (RFP)** A document issued by an owner, often as part of a competitive bidding process, that solicits proposals from architects, contractors or other suppliers for a product or service.

**Request for Qualifications (RFQ)** A step sometimes used in the formal process of procuring a product or service. It is typically used as a screening step to establish a pool of architects, contractors or other suppliers that are then qualified, and thus eligible to submit responses to a request for proposals (RFP). In this two-step process, the response to the RFQ will describe the supplier’s general qualifications to perform a service or supply a product, but generally will not include specific details or price proposals.

**Retainage** A portion of the money earned by the contractor that is withheld from periodic payments and retained by the owner as assurance that the contractor will complete the project.

**Schematic Design** A sub-phase of Princeton’s Study Phase, occurring after the Programming/Concept Phase, where an approved design concept is further studied and refined. Schematic design adds additional detail such as building form, site, energy use and sustainability strategies, general materials and building systems.

**Scope Creep** A general term used to describe unanticipated or unapproved needs or requirements requested by a user, stakeholder or other party. Princeton’s governance process, which utilizes an executive sponsor, provides a forum for consideration of these unplanned needs.

**Site** The geographical location of the project.

**Site Development** The planning, design, and construction of the area immediately outside of a building, which can include landscaping, parking, plazas, courtyards, sidewalks, etc. Usually defined as the area more than five feet from the exterior wall of a building.

**Soft Costs** A general term used to describe expenses or allowances in a budget that are non-construction related, including items such as permits, inspections, testing, fees, and furniture.

**Specialized Subconsultants** The sub-consultants, other than basic sub-consultants, retained by the A/E, as approved by Princeton University, including without limitation, civil engineering, acoustics, audiovisual, food service, lighting, security, interior design, and graphics design.

**Specifications** A document that describes in words what cannot be visualized or explained on a drawing or in a model. This document can be incredibly wide-ranging and include a detailed description of dimensions, construction, workmanship, materials, etc. of the work to be done. It can also address the performance criteria of the asset, the quality of the systems and products, which standards are applicable and how they should be executed, and even the products to be used.

**Stakeholder** An individual group, or organization that may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome or a project. Princeton stakeholders can be subject matter experts representing university departments in connection with compliance for elements such as public safety, environmental health and safety, as well as compliance with engineering and design standards. A Princeton stakeholder can also be a person or department which is impacted by the project, particularly the construction phase.

**Startup** In the final Approval phase of a Princeton project, at the end of construction, a general term to describe the activities that take place between commissioning and the achievement of steady-state operation. In some usage, the term startup, may include both commissioning (i.e., testing after mechanical completion) and startup of systems.

**Statement of Construction Cost** The periodic estimates of the construction cost of the project prepared at the end of each design phase by the contractor and by the A/E’s cost sub-consultant.

**Statement of Qualifications** The submittal prepared in response to an owner’s request for qualifications.

**Study Phase** The first phase of Tier 1 and the second phase of Tier 2 small capital projects includes Programming/Concept Design and Schematic Designs sub-phases. The approval of the project by the VPSPP and/or the Facilities Planning Group is needed at the end of the Study Phase to continue with design documentation, based on the schematic design and the project budget.

**Sub-consultant** A consultant who contracts with the prime consultant. Typical sub-consultants are structural, electrical, civil, and mechanical engineers; interior designers; landscape architects; acousticians; and telecommunications specialists.
**Subcontractor** A contractor who contracts directly with the prime contractor. Typical subcontractors are demolition, concrete, structural steel, mechanical, electrical, plumbing, fire alarm and carpentry.

**Substantial Completion** A milestone identifying that the work is sufficiently complete in accordance with the contract documents so that Princeton University may occupy, operate, or use the work or designated portion for the purpose for which it is intended.

**Substantial Completion Date** The date that Princeton and the CM/GC agree that a project is substantially complete.

**Sustainability Charrette** A collaborative session or sessions during the early phases of a capital project where sustainable strategies and approaches are considered. This session, led by facilities and the architect, includes users and stakeholders, considers a wide range of possible elements, and through research and consideration throughout the early phases, recommends goals to incorporate selected sustainable elements.

**Target Cost** The early cost for a project, or for construction of a project, approved by the Provost, toward which the project team works to develop a design solution.

**Tech Review** Periodic review by the university tech team for compliance with university standards and objectives.

**Tech Team** A group of stakeholders assembled by Facilities to review the project documentation, usually at the end of a design phase, to ensure compliance with University standards and functional objectives. Comments from this process are then conveyed back to the design team to incorporate into the project design.

**Testing and Inspection** Services directed by Princeton, either by a third-party inspection or testing entity, or a municipality having jurisdiction, to verify compliance with material specifications, drawings and codes.

**Users** A Princeton representative, or representatives, of a school, college, department, center or administrative unit responsible for the functional and operational requirements of a major capital project. A user provides general and detailed project requirements, facilitates decisions with user groups, and coordinates with the executive sponsor to establish clear communications and governance processes.

**USGBC** United States Green Building Council, an organization which governs a process by which owners can seek LEED certification for a project to recognize sustainable strategies incorporated into the design and construction of a project.

**Utility Infrastructure** The network of utility systems that support any building project, including power, water, sewer, chilled water, telecommunications, steam, etc.

**Value Engineering** A process that identifies and assigns values to the various functions of a building element, product or system and then seeks a final design that maximizes functional value and reliability while minimizing cost. While value engineering should occur throughout the course of design, it most often is used toward the end of the process in order to reconcile a construction budget that exceeds the target cost or authorized budget.

**Value Proposition** A statement of value that should be delivered by the project that ensures success in achieving University strategic priorities. The statement, which also outlines academic and functional objectives, is approved by the Provost in the Project Initiation Phase.