
**Washington University
Design Standards
for
Architectural Building Components**

Washington University - St. Louis
Department of Facilities Planning & Management
St. Louis, Missouri 63130

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PART 1 - INTRODUCTION

The Washington University department of facilities planning and Management is responsible for coordinating the planning and design for all new campus facilities. Their mission is to assure that each project provides the infrastructure to support teaching, research, scholarship, and service for present and future generations consistent with the policies of the Washington University Board of Trustees, and the mission statement of the institution at large:

"THE PROMOTION OF LEARNING BY STUDENTS AND FACULTY"

Each professional engaged in design and construction activities on behalf of the University is encouraged to employ the highest degree of professional skill and expertise to develop and effect solutions that successfully exemplify the mission statement of the University, consistent with the parameters outlined below. The department of facilities planning and Management is committed to facilitating those efforts as required to assure the same.

PART 2 - DEFINITIONS

Terms used in this document shall be defined as follows:

- A. "Architect/Engineer": The Architect or Engineer is the person lawfully licensed to preform architectural and/or engineering services in the state of Missouri. (including but not necessarily limited to the following: analysis of project requirements, development of project design, production of construction documents, specifications, & bidding requirements, and general administration of the construction contract). The term Architect and/or Engineer shall mean the Architect and/or his authorized representative. The Architect and/or Engineer and/or a designated construction coordinator will be the representative of Facilities Planning and Management throughout the design, and construction process, until final payment is due. The Architect and Engineers' authority to act on behalf of the Owner is limited to the extent provided for in the contract with the Owner.
- B. "Owner": Washington University, a Missouri corporation. All work shall be managed, directed *and subject to inspection* by the assigned Project Manager from the Department of Facilities Planning and Management (*or his/her representative*). The term Owner's Representative shall mean the Manager of Facilities Planning and Management.
- C. "Contractor": The individual, firm, or corporation undertaking the execution of the work under the terms and conditions of the contract.
- D. "As-Built Documents": Drawings and other records which accurately reflect changes made during the construction process. The contractor shall provide marked-up plans reflecting *all* changes (*CAD*) *and provide them*, to the Architect for use in preparing the As-Built documents as required by contract.

- E. "Shop Drawings": Drawings, diagrams, illustrations, charts, brochures and other data prepared by the Contractor, sub-contractor, manufacturer, and/or supplier which illustrate how specific portions of the work shall be fabricated or installed.
- F. "Samples": Physical examples furnished to illustrate materials, equipment or workmanship and to establish standards by which the work will be judged.
- G. "General Conditions": That *standardized* part of the *construction* contract documents which sets forth the responsibilities, rights and relationships of the owner and contractor.
- H. "General Conditions for Changes": The contractor will be required to state the percentage of the cost of changes to be applied to cover the cost of the general conditions via a line item in the form of bidders proposal.

PART 3 DESIGN CRITERIA

The design of all architectural elements shall optimally consider and incorporate solutions that speak to overall building aesthetics, economy, durability, maintenance, flexibility and enhancement of program performance. Design parameters will be monitored closely by the University. We will assist designers in interpreting and understanding the underlying concepts and philosophies behind the established parameters without interfering with their ability to effect a design which complies in all respects with the same. Regardless of the criterion stated here in, the design professional is ultimately responsible to review all aspects of the building design with the University's representative to confirm that all proposed materials, equipment and methods etc. are in fact acceptable to and approved by the Owner. These criteria shall be defined as follows:

- Aesthetic The goal of each design solution is to successfully meld legacy and future heritage into a built form whose detailing, mass and scale reflect the intrinsic character of the University. Work undertaken as part of a renovation and/or expansion shall match the existing and/or adjacent work in character, appearance and quality. Particular attention is to be paid to all details, profiles, and ornamentation when designing both interior and exterior spaces. The owner will consider the use of alternate materials. However written approval of the same must be obtained by the owner.
- Economy Project construction costs shall reflect a design yielding a solution that is *both* cost efficient and that meets the criteria established for the aesthetics, functions, and planned useful life of the building. The selection of construction materials and equipment, including the cost and availability of replacement parts shall minimize operation and maintenance costs. Acceptable pay-back periods of each assembly or system shall be determined by the owners authorized representative.
- Durability The established criteria for the useful life of buildings designed for Washington University is 200 years. The University has been in operation for more than 140 years,

and expects to continue as long as the need for education and research exists. Accordingly the use of exterior materials that resist prolonged exposure to sunlight, heat, freezing, moisture and corrosive effects of the atmosphere are a given. Interior components shall be selected which resist wear and tear through continuous daily usage. And mechanical systems shall be functional, reliable and have some reasonable degree of built in flexibility to adapt to changing conditions and functions.

Serviceability All components shall be designed in a manner that facilitates and encourages proper maintenance. Mechanical systems should be accessible for service from floor level whenever possible. Adequate clearances shall be established for all serviceable components. Particular attention should be paid to clearance and access requirements for all large components which have the potential to be removed or replaced at a later date. Finally, all necessary service utilities should be located within reasonable proximity of serviceable equipment.

Flexibility All designs should be developed with the understanding that future renovation is certain. In consideration of this, spaces should be laid out in a manner that maximizes and even embraces future renovation possibilities while minimizing costs. Establishing appropriate quantities, values, and dimensions for major utility services maximizing floor to ceiling/floor clearances (i.e., holding mechanical, electrical and plumbing runs tight to the structure above), routing of primary electrical circuits through structural walls when possible, and removing all abandoned equipment and services within a renovated space, typify desirable conditions to *be* achieved.

Objectives The basic objective of each design shall be to:

- A) Provide the components required to meet the project needs outlined in the building program, *as* established in conferences and workshop between the Owner, Architect and representatives of the respective engineering disciplines.
- B) To assure compliance with all codes, regulations and jurisdictional authorities governing all aspects of the project.
- C) Compliance with the requirements listed in this and all additional Washington University documents defining design/construction standards (Then list all applicable documents).

That owner shall be notified in advance of all meetings with governmental and jurisdictional officials for the purpose of identifying compliance requirements.

There may be an occasion when a mandatory University Standard and/or Standards is/are determined by the architect to be inconsistent with accepted design practice, safety standards, normal standards of care, or the architects best judgement. When this occurs the Architect shall so inform the Owner of the same prior to commencing with the project so that the Owner may consider alternative solutions and/or wether to waive the standard.

PART 4 - UNIVERSITY STANDARDS

The following documents have been developed by the University to serve as a guide to design professionals. These documents identify established mandatory university standards referenced above. Please be certain that your firm has received copies of these documents and that the appropriate team members have familiarized themselves with them prior to commencing work. Copies can be obtained from your University representative *from the Department of Facilities Planning & Management*.

Following is a list of the documents and their contents:

- A) Washington University Design Standards for Architectural Building Components
Outlines the Universities' architectural concept and expectations of the Architect's scope of services for each phase of the project.
- B) Washington University Design Standards for Engineered Building Systems
Outlines the universities' HVAC concepts for various applicable systems, describes energy conservation requirements and lists all required calculations and documents for each phase of the design.
- C) Washington University Material Standards
Lists the Universities' approved materials and manufacturers for each division of work based on the CSI format.
- D) Front End Documents
These documents *also* include the Instructions to Bidders, Form of Bidders Proposal and General Conditions to the Contract. It is intended that these front end documents be included in the specifications prepared by the designer.

PART 5 - ARCHITECTURAL SCOPE OF SERVICES

The Architects services consists of all work performed by the Architects' employees, consultants and sub-consultants. All engineers, consultants and service providers required to complete the project design *shall be approved at the initiation of the project*, and shall be approved by the Owner. *Once approved, their services shall be contracted for by the Architect*. All engineers and specialty consultants to preform services needed to complete the design shall be identified by the Architect prior to commencing work on the project.

Reimbursable expenses are limited to those items which can not be clearly quantified prior to the execution of the contract. Allowable billing of reimbursable items is actual cost plus five percent. Receipts for all reimbursable items shall be included with monthly billings. Expenses considered as reimbursable include:

- Airfare associated with the project.
- Lodging associated with the project.
- Printing and reproduction of project documents.

Communication and fax expenses.
Postage and shipping expenses associated with the project.
Specialty consultants.

The University guidelines with respect to reimbursable expenses are as follows:

- 1) Credit card receipts are not acceptable for lodging expenses. Itemized receipts from the lodging provider are required. Lodging costs shall be minimized to the extent reasonably possible.
- 2) First class air fare will not be reimbursed.
- 3) Taxi cabs and University shuttles shall be utilized when out of town visits are made to the campus. Rental cars shall be used only when absolutely necessary and only with prior approval of the owner.
- 4) The maximum reimbursement for evening meals is \$25.00 per person. If more than one person is involved in the reimbursable meal, their name must be indicated on the receipt.
- 5) Billings for reimbursable items which do not include the receipt or invoice will not be approved for payment.

The architectural scope of services generally varies from project to project. It is the responsibility of the architect to gain a full understanding of the scope of services prior to submitting a proposal. The proposal must clearly define any and all services that are included. Optional services may be listed as alternates. The University identifies the following *as typical* standard services for *each project phase*:

In addition it is expected that throughout each phase the architect will - Prepare, distribute, and correct(when necessary), all meeting notes and/or minutes.

Programming & Pre- Design Phase

- 1) Identify *required action items* immediately after contract execution *for each* phases as provided in the scope.
- 2) Create and distribute job calender of estimated phase starts and completion *including the following phases*:
 - A) Pre-Design & Programming
 - B) Site Analysis
 - C) Schematic Design
 - D) Design Development
 - E) Construction Documents

- F) Bidding/negotiation
 - G) Contract Administration
 - H) Post-construction
- 3) Create schedule for budget and progress reviews.
 - 4) Create project directory

Programming - Building Configuration, Construction, & Materials

- 1) Create/obtain list of building functions & spaces
- 2) Create/obtain list of equipment & furnishings
- 3) Obtain building construction and operating cost estimates
- 4) Prepare and proceed with client and user surveys
- 5) Identify *and verify* overall occupancy and specific departmental & room occupancies *and spatial estimates*.
- 6) Verify occupancy and spatial estimates. Identify possible errors and omissions.
- 7) *Create / Obtain lists:*
 - A) Departments and Relationships to Other Departments.
 - B) Building Rooms and Relationships to Other Rooms.
 - C) Occupancies Type & Number.
 - D) Equipment & Equipment Functions.
 - E) Special Furnishings - Custom.
 - F) Owner Supplied Equipment & Furnishings.
- 8) List required or optional provisions for phased construction and future additions
- 9) Identify property building line limitations
- 10) Verify site zoning or other restrictions on building height
- 11) Identify orientation considerations
 - A) Climactic
 - B) Energy
 - C) Views
 - D) Traffic/Parking
 - E) Public Transportation

- F) Regulatory or deed restrictions
- 12) Identify options of number of building stories and total height
- 13) Estimate size(s) of core area(s) required for:
 - A) Mechanical services
 - B) Electrical chases
 - C) Vertical transportation
 - D) Stairs/smoke towers 1
- 14) Estimate structural spans to accommodate room spatial needs
- 15) Identify options structural systems
- 16) Identify options of building configuration
- 17) Identify suitable types of construction systems based on 15 & 16 above
- 18) Identify suitable building cladding and fenestration types
- 19) Identify suitable interior partitioning, flooring, and ceiling systems
- 20) Estimate construction & site development costs
- 21) Establish who is responsible to identify room relationships & their relative position of importance

Programming - Occupancy Needs & Spatial Allocation

- 1) Establish criteria for importance of room functions & relationships. Create user questionnaire.
- 2) Create a departmental spatial interaction matrix (list of departments and their relationship To other departments)
- 3) Create room by room spatial interaction diagrams showing all room relationships
- 4) Identify numerical ratings of the importance of relationships of each room to their rooms
- 5) Make link & node diagrams representing relationships identified in matrices
- 6) Make bubble diagrams and manipulate until plan conflicts are eliminated
- 7) Create diagrammatic/schematic building plans

- 8) Note relative spatial areas for all departments, rooms, mechanical, vertical transportation, service, exit stairs and corridors, and horizontal circulation.
- 9) Review program and pre-design decisions with client

Preliminary Design Program

- 1) Client & Client representatives
- 2) Chain of responsibility/decision making
- 3) Generally stated needs & desires
- 4) Overriding goal/purpose of building project
- 5) Primary building function
- 6) Secondary building function
- 7) Estimated construction budget
- 8) Estimated construction deadline
- 9) Occupant population type and size to fulfill stated function
- 10) Special equipment and/or furnishings to fulfill stated function
- 11) Building to building division size to accommodate circulation and 9 & 10 above
- 12) Future building functions & population
- 13) Limits of future expansion
- 14) Existing facilities to be a part of this project
- 15) External Restraints on building area, shape, & height
 - A) Total lot dimensions and area
 - B) Useable lot area
 - C) Setback restrictions
 - D) Other zoning restrictions
 - E) Deed covenants
 - F) Easements

- G) Rights of Way
 - H) Air rights
 - I) Facade Easement
 - J) Existing construction
 - K) Solar orientation
 - L) Building Shadow restrictions
 - M) Required public spaces
 - N) Groupings of population or function that require large open spaces
 - O) Groupings of population or function that require courts or atriums
 - P) Groupings of population or function that require direct access to exterior ground level
 - Q) Functions that require high ceiling interior spaces
 - R) functions requiring daylight
 - S) Views
 - T) Other
- 16) Preliminary Structural Decisions
- A) Special span requirements related to space sizes, heights, & groupings
 - B) Bay sizes
 - C) Special soil conditions that restrict structural designs
 - D) Other special site conditions that restrict structure or construction
 - 1. Building air space
 - 2. Connection to adjacent structures
 - E) Anticipated Building configuration - all levels
 - F) Wings/Major divisions in building plan and configuration
 - G) Core size, shape, & location
 - H) Construction phases for structural work
 - I) Anticipated structural frame
 - J) Anticipated construction/class system
 - K) Anticipated substructure systems & interior framing
- 17) Vertical transportation options
- A) Elevator Core
 - 1. Central/offset/detached
 - 2. Interior/exterior
 - B) Freight elevators/special lifts
 - C) Escalators
- 18) Fire Code Requirements
- A) Exit stairs/corridors
 - B) Walls and partition ratings
 - C) Fire Barriers
 - D) Door ratings

- 19) Interior Planning & Construction
 - A) Anticipated Interior Partitions
 - 1. Framing
 - 2. Finishes
 - 3. Moveable partitions, frames/finishes
 - 4. Demountable partitions, frames/finishes
 - B) Anticipated ceiling construction
 - 1. Ceiling finishes
 - C) Anticipated primary floor space construction
 - 1. Primary floor space finishes
 - D) Anticipated secondary space floor construction
 - 1. Secondary floor space finishes

- 20) Exterior Design & Construction
 - A) Special environmental conditions that restrict materials for building envelope
 - B) Anticipated exterior framing
 - C) Anticipated exterior cladding type and material
 - D) Anticipated exterior finishes
 - E) Anticipated fenestration
 - F) Fireproofing
 - G) Weather protection
 - H) Anticipated roof framing
 - I) Anticipated finish roofing

- 21) Mechanical
 - A) HVAC system
 - 1. Perimeter
 - 2. Interior
 - B) Solar Components
 - C) Mechanical spaces - all levels

- 22) Lighting & Electrical
 - A) Anticipated lighting for primary space
 - B) Anticipated lighting for secondary space
 - C) Special power requirements
 - D) Other

Predesign & Schematic Site Review

- 1) Confirm accuracy of major features of survey by observation & measurement
- 2) Obtain original site survey at an appropriate scale

- 3) Obtain aerial or satellite photos of the site and its surroundings & have an overall site photo produced at a scale to match final site survey
- 4) Obtain seasonal climate and microclimate statistics
- 5) Compute seasonal solar orientation data
- 6) Confirm that the surrounding environment has been examined for negative factors
- 7) Verify what test data will be needed for consultants to complete their work and who they recommend
- 8) *Visit and examine the site and assure that all Consultants have reviewed site data and that it is adequate.*
- 9) Permits & Approvals
 - A) Prepare project directory
 - B) Identify code issues- ambiguities, contradictions, duplications, overlaps
 - C) Obtain clarifications of contradictory or ambiguous regulations & communicate to team
 - D) Identify sequential requirements
 - E) Prepare a calender for all permit and approval processes
 - F) Confirm zoning status, approvals, legal, setbacks, height limits, lot size & buildable area, distances to adjacent areas, parking, & miscellaneous requirements.

Schematic Design

- 1) Administrative
 - A) Confirm thoroughness of cost estimates
 - B) Schedule milestone dates for cost estimates and estimate updates
 - C) Determine estimating system to be used & phases what different systems will be used.
 - D) Establish cost estimate form for schematic and DD phases including the following
 1. Cost data: Overall Construction Foundation
 - Structural Framing Roofing
 - Envelope Interiors
 - Floors Walls
 - Ceilings Cabinets
 - HVAC Plumbing
 - Fire Protection Electrical
 - Vertical Transportation Sitework
 - Special Equipment Furnishings
 - Contingency Allowance

- E) Decide cost information source building labor & materials
 - F) Schedule decision on design of detailed construction estimate forms for CD & Bid phases.
- 2) Design
- A) Update/confirm program requirements with client-function, occupancy, & spatial
 - B) Determine building size, configuration, stacking, & structural system if not yet done
 - C) Confirm structural module with engineer
 - D) Confirm interior partitioning & ceiling module
 - E) Plan major/departamental spaces per diagrams generated from program and obtain client approval.
 - F) Prepare notes & diagrams as guised for consultants preliminary work
- 3) Updates
- A) Compare program requirements with budget and legal requirements, confirm budget agreement, & settle contradictions between program needs, budget, & legal requirements
- 4) Document Coordination & Checking
- A) Require all consultants to prepare schematics using the same scale, format, & drawing positioning as the architectural drawings
 - B) Obtain lists of special building equipment & fixtures required that may affect consultants work
 - C) Reach agreement on specific appropriate building systems, i.e.: structural, mechanical etc. & confirm they are compatible with each other.
 - D) Estimate spatial requirements for engineered systems
 - E) Coordinate engineering schematic building diagrams
 - F) Schedule meetings with all disciplines to coordinate and cross check drawings
 - G) Schedule completion date for all disciplines - schematic drawings
 - H) Obtain preliminary estimates for all building systems probable construction cost s
 - I) Confirm all preliminary designs conform to local code and utility co requirements
- 5) Architectural Schematic Drawings to Include
- A) Site plan
 - B) Floor plans
 - C) Roof plan
 - D) Cross sections
 - E) Exterior elevations
 - F) Interior elevations
 - G) Wall sections
 - H) Design details
- 6) Structural Schematic Drawings *to Include:*

- A) Design criteria
 - B) Structural grid or system
 - C) Alternative grids or structural systems
 - D) Schematic framing plans & sections
 - E) Schematic foundation plan
 - F) Schematic structural cross sections
 - G) Calculations
 - H) Required clearances for other construction
- 7) Mechanical Schematic Drawings/ *Data to Include*:
- A) Design criteria:
 - 1. Energy use & conservation
 - 2. HVAC system type & standard
 - 3. Plumbing supply and drain types and standards
 - 4. Fire protection systems
 - 5. Mechanical equipment estimated spatial requirements in plan
 - 6. Mechanical equipment estimated spatial requirements in section
 - 7. Alternate mechanical systems
 - B) Preliminary equipment and material schedules
 - C) Outline specifications
- 8) Electrical Schematic Drawings *to Include*:
- A) Reflected ceiling lighting plans
 - B) Power and switching
 - C) Communications equipment, chases, and outlets
 - D) Fire protection & alarms
 - E) Security systems
 - F) Major electrical equipment sizes and locations
 - G) Electrical vaults & transformer rooms
 - H) Estimated spatial requirements for equipment and service
 - I) Alternate systems
- 9) Landscape Schematic Drawings *to Include*:
- A) Schedule multi-discipline coordinations meetings/ and establish procedures
 - B) Reach agreement with landscaper architect on number and content of landscape schematic drawings and notes
 - 1. Design criteria
 - 2. Preliminary planting and landscaping plan
 - 3. Site-related plumbing work
 - 4. Site related electrical work
 - 5. Alternate landscaping concepts
- 10) Interior Schematic Design Drawings *to Include*:

- A) Preliminary interior partition landscaping
 - B) Preliminary furniture planning
 - C) Material & finishes palette
- 11) Specification at Predesign & Schematic Phase
- A) Coordinate decisions & alternatives on:
 - 1. Room functions & relationships
 - 2. Construction system
 - 3. Structural system
 - 4. Mechanical system
 - 5. Lighting
 - 6. Dominant exterior materials
 - 7. Interior partitioning system
 - 8. Overall materials, finishes, and fixture quality
 - 9. Superior
 - 10. Middle grade
 - 11. Economy grade
 - 12. Mixed grades
 - B) Start project outline specifications or contents list in coordination with schematic architectural drawings, & review with consultants the extent of outline specs. Required at this phase.
- 12) Update job calendar of start and completion dates for each phase & distribute.
- 13) Create schedule for budget and progress reviews.
- 14) Have all consultants prepare cost estimates for their phases of work, including stated contingency and incorporate into overall construction cost estimate.
- 15) Prepare presentation materials, including design options, floor area calculations, preferred construction methods, cost data and availability of equipment & furnishings .
- 16) Present the schematic design and cost data .
- 17) Identify changes in the schematic design required by client, and note extended repercussions, and /or contradictions between original design program.

Design Development Phase

- 1) Agency Consulting, Review, and Approval
 - A) Identify new consultants required for this phase
 - B) Update information on building occupancies and current cost estimates and distribute.
 - C) Obtain or update consultants current estimates of building operating costs.

- D) Review the above with client and obtain written approval of the building mechanical and electrical systems.
 - E) Confirm that selected engineering and building systems are compatible with one another.
- 2) Owner Supplied Data Coordination.
- A) Obtain updated estimates of spatial requirements for engineered systems.
 - B) Reconfirm program functional, occupancy, and spatial requirements with client.
 - C) Confirm design with clients budget-settle contradictions between program needs and funding.
 - D) Obtain client preferences in bidding and contracting that might affect construction drawings and specifications.
 - E) Obtain or update lists of special building equipment and fixtures required by client affecting consultants work
- 3) Architectural Design & Documentation
- A) Review changes in program and note their possible impact on project design
 - B) Review schematic design, updates, and program changes for possible conflicts with original design intent or fundamental engineering decisions
 - C) If there are important differences verify the reasons for and sources of each.
 - D) Communicate to owner (and all team members) current status of work and schedule for Design Development phase.
 - E) Confirm the type of contract to be used and evaluate its affect on drawing and specifications content and format.
 - F) Prepare architectural design development drawings *to Include:*
 - 1. Site plan
 - 2. Floor plans
 - 3. Roof plan
 - 4. Cross sections
 - 5. Exterior elevations
 - 6. Interior elevations
 - 7. Wall sections
 - 8. Design details
- 4) Prepare and coordinate outline specifications (refer to specification checklist)
- 5) Coordinate architectural Design Development drawings with other disciplines
- 6) Compare developing design with budget, program, and regulatory requirements and note the following changes that may have occurred:
- A) Building area
 - B) Siting
 - C) Structure

- D) Mechanical Systems
 - E) Construction Systems
 - F) Materials
- 7) Review changes with those who initiated them and note reasons
- 8) Prepare numerical comparisons with program requirements including
- A) Building Floor Area
 - B) Building Volume
 - C) Useable Area Ratios
 - D) Etc.
- 9) Review preferred construction methods for impact on design and documents
- 10) Prepare data on cost and availability of special equipment and furnishings
- 11) Prepare detailed construction cost estimate (i.e.: quantity survey) for submission with the Design Development package
- 12) Submit Design Documents to client including:
- A) Drawings
 - B) Calculations
 - C) Contracts
 - D) Outline Specifications
 - E) Updates on Construction Cost Estimates (See Presentations)
- 13) Structural Design and Documentation to Include:
- A) Design Criteria
 - B) Structural Grid or System
 - C) Structural Framing Plan(s) and Section(s)
 - D) Preliminary Foundation Plan
 - E) Estimated Sizing of Primary Structural Members
 - F) Calculations
 - G) Required Clearances for Other Work
 - H) Materials Schedules
 - I) Specifications
 - J) Schedule completion dates for interim and final structural Design Development drawings
 - K) Confirm that the proposed structural system satisfies all legal requirements
- 14) Mechanical Design and Documentation *to Include*:
- A) Building plans and sections *showing*:
 - 1. Noise and Vibration Control

2. HVAC System Type and Standard
 3. Fire Protection Systems
 4. Plumbing Supply and Drain Types and Standards
 5. Equipment Sizes and Locations
 6. Chase Sizes and Locations
 7. Duct Sizes and Locations
 8. Mechanical Equipment Estimated Spatial Requirements in Plan
 9. Mechanical Equipment Estimated Spatial Requirements in Section
 10. HVAC Calculations
 11. Energy Use and Conservation Calculations
 12. Preliminary Equipment and Material Schedules
 13. Outline Specifications
- B) Schedule completion dates for interim and final mechanical Design Development drawings.
- C) Confirm the acquisition of necessaria approval and permits for all utility service:
1. Gas
 2. Electric
 3. Water
 4. Sewer
 5. Communications
- D) Confirm compliance of the building mechanical and plumbing systems design with applicable codes and utility company requirements
- E) Provide estimate for construction cost of buildings mechanical systems
- F) Provide estimate for operating cost of buildings mechanical systems
- 15) *Electrical Design and Documentation to Include:*
- A) Reflected Ceiling and Lighting Plans
- B) Power and Switching
- C) Fire Detection and Alarm Systems
- D) Security Systems
- E) Communications Equipment, Chases and Outlets
- F) Electrical Equipment Sizes, Locations, and Capacities
- G) Electrical Vaults, Transformer Rooms
- H) Chase Sizes and Locations
- I) Duct Sizes and Locations
- J) Confirm compliance of the building electrical systems design with applicable codes and utility company requirements.
- K) Provide estimate for construction cost of buildings electrical system.
- 16) *Civil Design and Documentation to Include:*
- A) *Confirmation of all site test results.*
- B) *Identification of additional tests that may be required*

- C) *Coordination of* civil, structural and architectural designs
 - D) Cross check civil design with structural, landscaping, and architectural plans
 - E) Site plans and sections showing:
 - 1. Cut and Fill
 - 2. Excavations
 - 3. Irrigation
 - 4. Drainage
 - 5. Site Related Construction
 - F) Outline Specifications
 - G) Sitework and civil engineering design *confirmed to be in compliance with applicable codes and regulations*
 - H) Provide estimate for civil engineering related construction costs
- 17) Landscape Design and Documentation *to Include:*
- A) *Coordination of* landscaping and architectural drawings,
 - B) Cross check design
 - C) Preliminary landscaping planning
 - D) Site-related plumbing work
 - E) Site related electrical work
 - F) Outline specifications
 - G) Estimate for landscaping development costs
- 18) Interior Design and Documentation *to Include:*
- A) Preliminary interior partition landscaping
 - B) Preliminary furniture planning
 - C) Materials and finish palette
 - D) Color schedule
 - E) Outline specifications
 - F) Estimate for interior design furnishing and fixtures costs materials research and specifications
 - G) Research on materials, equipment, fixtures, and building systems
 - H) List of primary first choices and alternative choices in materials
 - I) Project outline spec in coordination with architectural schematics
 - J) Coordinate decisions on preliminary room finish schedule
 - 1. Construction System
 - 2. Structural System
 - 3. Mechanical System
 - 4. Lighting
 - 5. Vertical Transportation
 - 6. Exterior Materials
 - a. Site Appurtenances
 - b. Roofing
 - c. Walls

- d. Fenestration
 - e. Interior Partition Systems
 - f. Cabinetry
 - g. Specific Area Materials, Finishes, and Fixture Quality
- K) Start checklist of special standards & product literature required for this project
- 19) Project Development Scheduling
- A) Create/update job calender of estimated phase start and completions
 - 1. Design Development
 - 2. Construction Documents
 - 3. Bidding/negotiation
 - 4. Contract Administration
 - 5. Post Construction
 - B) Estimating probable construction cost.
 - 1. Prepare overall construction cost estimate with contingency (including estimates from all consultants)
- 20) Presentations
- A) *Verify with Client* the Design Development Presentation to Include:
 - 1. Sketch Rendering
 - 2. Finish Two dimensional or Perspective Rendering
 - 3. Block Models
 - 4. Detail Models
 - 5. Computer Print out or Plots
 - 6. Slides
 - 7. Video

Construction Documents /Working Drawings

- 1) Administration - Updates after Design Development
 - A) Update/revise Schedule, and Project Planning Chart
 - B) Record All Pertinent Discussions and Decisions That Have Not Yet Been Recorded
 - C) Obtain Written Approval from Client to Proceed with Construction Documents
- 2) Working Drawing Planning
 - A) Establish Drawing Format for Construction Documents's with All Consultants
 - B) Prepare Drawing index and Determine Numbering System
 - 1. Division by Discipline
 - 2. CSI-related
 - 3. Construction Sequence Divisions
 - C) Prepare 1/4 Size mini-mock up of all drawings w/sketches & notes/data to go on each sheet distribute for review.
 - D) Determine Final Printing System

- 3) Disciplines Coordination And Document Checking
 - A) Identify new consultants required for this phase
 - B) *Distribute* up-dated information on building occupancies and current cost estimates
 - C) Obtain or update consultants current estimates of building operating costs
 - D) Review the above with client and obtain written approval of the building mechanical and electrical systems (based on review of operating costs)
 - E) Review previous decisions on structural, construction, mechanical, and other systems for possible economics and improvements
 - F) Confirm that various selected engineering and construction systems are compatible with one another.
 - G) Obtain updated estimates of spatial requirements for engineered systems
 - H) Confirm who, (consultants, client, or others)is handling acquisition of approvals and permits for all utility services:
 1. Gas
 2. Electric
 3. Water
 4. Sewer
 5. Telephone
 6. Cable Tv
 7. Computer Link
 8. Utility-supplied Steam
 9. Utility-supplied Cooling
 10. Other
 - I) Obtain or update and distribute lists of special building equipment and fixtures which may affect consultants work.
- 4) Agency Consulting, Review, and Approvals
 - A) Establish a checklist & timetable for the clients applications for approvals & permits.
- 5) Owner Supplied Data Coordination
 - A) Reconfirm program functional, occupancy, and spatial requirements with client.
 - B) Confirm design with clients budget-settle contradictions between program needs and funding.
 - C) Obtain client preferences in bidding and contracting that might affect construction drawings and specifications.
 - D) Identify bid alternates and plan content and organization of bid documents.
- 6) Architectural Design & Documentation
 - A) Review changes in the program and evaluate their impact on design
 - B) Review Design Developments, design updates, and program changes for code violations
 - C) Review Design Developments design updates, and program changes for conflicts with original design intent of fundamental engineering decisions.

- D) If significant differences are present verify and document the reasons for and sources of the differences.
 - E) Provide written update of the status of the work and schedule for the CD phase
 - F) Confirm the type of construction contract to be used, and evaluate the effect on the drawing and specifications content and format
 - G) Prepare and coordinate final specifications
 - H) Coordinate development of documents between all disciplines and compare to budget, program and regulatory requirements. Note changes that have occurred in the following:
 - 1. Building Area
 - 2. Siting
 - 3. Structure
 - 4. Mechanical Systems
 - 6. Construction Systems
 - 7. Materials
 - I) Determine and note reasons for changes and review questionable changes with those who initiated them.
 - J) Review preferred construction methods for impact on design and documentation.
 - K) Prepare data on costs and availability of special equipment & furnishings.
 - L) Prepare detailed construction cost estimate.
 - M) Confirm required submittal date of all CDs to client.
- 7) Structural Design and Documentation to Include:
- A) Design Criteria
 - 1. Structural Grid or System
 - 2. Structural Framing Plan(s) and Section(s)
 - 3. Foundation Plan
 - 4. Calculations
 - 5. Required Clearances for Other Work
 - 6. Structural Details
 - 7. Materials Schedules
 - 8. Specifications
 - B) Schedule completion dates for interim and final Construction Documents & specifications
 - C) Confirm that the proposed structural system satisfies all legal requirements
- 8) Mechanical Design and Coordination
- A) Confirm with the mechanical consultant the acquisition of necessary approvals and permits for all utility services.
 - B) *Construction documents to include:*
 - 1. Building Plans and Sections to Show:
 - a. Noise and Vibration Control
 - b. HVAC System Type and Standard

- c. Fire Protection Systems
 - d. Plumbing Supply and Drain Types and Standards
 - e. Equipment Sizes and Locations
 - f. Chase Sizes and Locations
 - g. Duct Sizes and Locations
 - h. Mechanical Equipment Spatial Requirements in Plan
 - I. Mechanical Equipment Spatial Requirements in Section
 - j. Mechanical Fixture and Equipment Schedules
 - k. Mechanical Construction Details
 - l. HVAC Heat Load and Cooling Calculations
 - m. Energy Use and Conservation Calculations
 - n. Equipment and Material Schedules
 - o. Specifications
 - p. Mechanical Systems Operations and Maintenance Instructions
- C) Confirm compliance of the building mechanical and plumbing systems design with applicable codes and utility company requirements
 - D) Identify changes in the scope of the mechanical work that have occurred during the Design Development phase.
 - E) Determine the impact on cost of revisions in mechanical work
 - F) Acquire probable estimates for construction costs of buildings mechanical systems
 - G) Acquire probable estimates for operating cost of buildings mechanical systems
- 9) Electrical Design and Coordination
- A) Identify changes in scope of electrical work that have occurred during Design Development phase
 - B) Determine the impact of cost of revisions in electrical work
 - C) Confirm that changes in electrical design comply with legal requirements
 - D) Construction documents *to Include*::
 - 1. Bidding plans and sections to show:
 - a. Reflected Ceiling and Lighting Plans
 - b. Power and Switching
 - c. Fire Detection and Alarm Systems
 - d. Security Systems
 - e. Communications Equipment, Chases and Outlets
 - f. Electrical Equipment Sizes, Locations, and Capacities
 - g. Electrical Vaults, Transformer Rooms
 - h. Chase Sizes and Locations
 - I. Duct Sizes and Locations
 - j. Fixture Schedules
 - k. Electrical Construction Details
 - l. Electrical, Communications, Security, Fire, and Related Systems and Equipment Maintenance Instructions
 - m. Specifications

- E) Arrange the assistance of the electrical engineer in obtaining approvals and permits for electrical communications services.
 - F) Obtain updated final estimates for probable electrical systems construction costs.
- 10) Civil Design and Documentation
- A) Confirm that all previously requested site tests have been received and transmitted to client, consultants, & design team.
 - B) Identify additional tests that may be required
 - C) Cross check civil, structural, landscaping and architectural designs
 - D) Civil Engineering Construction Documents to Include:
 - 1. Site Plans and Sections Showing:
 - a. Cut and Fill
 - b. Excavations
 - c. Irrigation
 - d. Drainage
 - e. Site Related Construction
 - f. Civil Engineering Construction Details
 - g. Specifications
 - e) Confirm compliance of the sitework and civil engineering design with codes and regulations
 - F) Provide estimate for probable civil engineering related construction costs
- 11) Landscape Design and Documentation
- A) Coordinate landscaping and architectural drawings, cross check design.
 - B) *Landscape Construction Documents to Include:*
 - 1. Landscaping Plans
 - 2. Sitework Construction Details
 - 3. Site-related Plumbing Work
 - 4. Site Related Electrical Work
 - 5. Specifications
 - 6. Landscaping Care Instructions
 - C) Identify special order planting that must be ordered early, to assure delivery and installation before the compliance date.
 - D) Update estimates for probable landscaping development costs
- 12) Interior Design and Documentation
- A) List and schedule special order furnishings(such as carpet) that must be ordered early, to assure delivery and installation before move in date.
 - B) *Interior Design Construction Documents to Include::*
 - 1. Interior Partition Landscaping
 - 2. Furniture Selection and Planning
 - 3. Fixtures Selection and Finishes Palette

4. Materials and Finish Palette
 5. Color Schedule
 6. Interior Design Detailing
 7. Specifications
- C) update estimate for interior design furnishing and fixtures costs.
- 13) Finish Specifications
- A) Check completeness of sections and consistency of sequence of information.
1. Materials
 - a. Generic Name
 - b. Proprietary Name with Manufacturer
 - c. Description by Use
 - d. Description by Performance Criteria
 - e. Description by Reference Standard
 2. Required Characteristics of Materials
 - a. Gauge or Weight
 - b. Sizes, Nominal or Finishes
 - c. Type of Finish
 - d. Allowable Moisture Content
 3. Components or Proportions of Components of Materials
 - a. Mixes
 - b. Temperature Protection
 - c. Moisture Protection
 4. Installed Location on the Job - If Not Fully Indicated in the Drawings
 5. Preparation for Installation
 - a. Pre-job Inspection
 - b. Coordination with Other Subcontractors
 - c. Cleaning
 - d. Preparation of Surfaces
 6. Installation
 - a. On Site Fabrication
 - b. Connection to Other Work
 - c. Dusting & Fitting
 - d. Finishing
 7. Coordination
 - a. Broad scope Working Drawing Sheet Reference
 - b. Detail Drawing Sheet Reference
 - c. Consultants Drawing Sheet Reference
 - d. Related And/or Connecting Work by Other Trades or Subcontractors
 - e. Related Specification Sections
 8. Workmanship Standards
 - a. Quantified Measurements
 - b. Referenced to Published Standards
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- c. Approval by Inspection
 - 9. Inspections & Tests
 - 10. Repair & Patching
 - 11. Clean Up, Preparation for Other Work
 - 12. Warranties, Bonds, or Guarantee Requirements
 - 13. Post-construction Adjustments or Service
 - B) Address Common Omissions or Ambiguities (See Attached List)
- 14) Project Development Scheduling
- A) Create Up-date and Distribute Job Calender of Estimated Phase Start and Completions
 - 1. Construction Documents
 - 2. Bidding/negotiation
 - 3. Contract Administration
 - 4. -Post Construction
 - B) Estimating Probable Construction Cost
 - 1. Obtain All Consultants Final Construction Cost Estimates
 - 2. Prepare Overall Construction Cost Estimate with Contingency
 - C) Cross Check Coordination Checklist Construction Documents

Pre-Bid, Bidding & Negotiations

- 1) Administration
 - A) Update schedule & project planning chart
 - B) Obtain clients written approval of the construction documents
 - C) Obtain clients written approval to proceed with the bidding process
 - D) Establish bid opening date & pre-bid task time schedule
 - E) Assemble bid documents:
 - 1. Bid Notice
 - 2. Bid Advertisement/invitation
 - 3. Instructions to Bidders
 - 4. Contractors Qualification Statements
 - 5. Bid Form
 - 6. Owner-contractor Agreement
 - 7. Bid Documents Deposit
 - 8. Bid Security/bid Bond
 - 9. Performance Bond/labor & Material Payment Bond
 - 10. General & Supplementary Conditions
 - 11. Construction Documents, (Drawings, Specifications, & Addenda)
 - F) Confirm completion of document checking & coordination
 - G) Prepare list of favored contractors & subcontractors.
 - H) Confirm that all necessary permits and approvals have been obtained from regulatory agencies & public utilities.

- I) Confirm clients decision on the selection of contract and fee type and related options (phased construction, fast track, cm, design build, contractor prepared construction documents).
- J) Identify insurance & bond requirements the client will require of the contractor.
- K) List and confirm what materials, equipment, and furnishings are supplied by the client and installed by the contractor.
- L) List and confirm what materials , equipment, and furnishings are supplied by the client and installed by anyone other than the contractor.
- M) Confirm that the client has supplied an accurate site survey, site legal description, and a soil and subsurface condition report, all to be included with the construction documents.
- 2) Addenda
 - A) Prepare addendum log in the register of bid documents.
 - B) Distribute addenda to all bidders, and when responding to bidders request for clarification or additional data send copies of all responses to all other bidders as an addendum.
- 3) Bidding & Negotiations
 - A) Hold pre-bid meeting with prospective bidders & client
 - B) Prepare report on pre-bid and send to all concerned parties
 - C) Prepare bid tabulation form
 - D) Advise bidders of bid opening data, time, & location, and confirm their participation
 - E) Verify validity of all contractors, & major subcontractors licenses
 - F) Confirm enforcement of rules regarding bid security
- 4) Analysis of Alternates & Substitutions
 - A) Prepare a confirmation form to establish in writing all verbal interpretations, instructions, and confirmations. Establish a time limit within which copies of same must be distributed.
 - B) Confirm changes and alternates with client in writing
 - C) Establish record of notifications to the Contractor of approved/disapproved alternates
 - D) Notify all bidders of accepted substitutions
- 5) Bid Evaluation
 - A) Check bids for errors & omissions
 - B) Write a Bid tabulation with the latest construction cost estimates
 - C) Review significant discrepancies between bid tabulations & latest construction cost estimate
 - D) Prepare memo to explain the reasons for the bid and estimate discrepancies , their impact, and recommended next steps
 - E) Review cost and bid problems with client
 - F) Document bid expiration dates
 - G) Review bids with client and recommend acceptance or rejection.
 - H) Record reasons for acceptance/rejection

- 6) Construction Contract Agreements
 - A) Provide client with checklist of separate designer/client/contractor responsibilities as stated in the
 - B) Review the construction plan and time schedule with the client and contractor for inclusion into the contract.
- 7) Post Bidding Administration
 - A) Create a log for recording all change orders and modifications to the contract.
 - B) Provide all necessary contract documents, specified equipment brochures, and related project data to the contractor.
 - C) Identify bid tabulation data, special agreements addenda, and memos, reports, minutes, and correspondence that should be included in the final Project Manual as part of the construction contract or documents.
 - D) Obtain written approval from client to proceed with construction & construction administration contract.
- 8) Construction Contract Administration
 - A) Update routing list and project directory of all parties who should receive memos and notices regarding project modifications, special instructions to the contractor, interpretations, clarifications etc.
 - B) Make a calendar schedule of future time, budget, and progress reviews
 - C) Review previously scheduled dates for construction phases, and revise as needed project administration - preconstruction
 - D) Create a construction contract administration manual including (see attached list).
 - E) Confirm the method and degree of contract administration and site observation.
 - F) Administration by principal in charge, project manager, project architect, other management or staff.
 - G) Part time site observations visits. Estimate frequency and duration
 - H) Full time project representative
 - I) Establish and schedule construction administrative personnel.
 - J) Establish hierarchy of command, communication, and responsibilities
- 9) Project Administration - Actions Regarding Contractor
 - A) Confirm construction contract is complete including schedule of values
 - B) Acquire list of proposed sub-contractors from the prime/general contractor
 - C) Review the same with consultants
 - D) Assist client with sub-contractor approvals. Obtain clients written approval of same.
 - E) Send rejection memos regarding disapproved subcontractors to general contractor
 - F) Write change orders when necessary to modify contract terms because of any substitution of subcontractors
 - G) Review and approve or have corrected contractors schedule of values before the first scheduled application for payment

- H) Review contractors schedule of required shop drawings, samples, and colors
- I) Review and approve or have corrected the contractors estimated job construction progress schedule
- J) Notify the client of estimated job construction schedule and any scheduling problems
- K) Establish tentative job observation schedule based on the contractors estimated construction schedule
- L) Select format for project schedule chart
 - 1. Bar chart
 - 2. CPM
 - 3. PERT
 - 4. Precedence Network
- M) Confirm that all contractor schedules(shop drawing, values, job progress, etc) conform to contract requirements
- N) Provide contractor with all necessary construction documents
- O) Establish time, date, & location for pre-construction meeting
- 10) Construction Phase
 - A) Provide the site representation necessary to attend progress meetings, examine material mock-ups, verify material compliance with the specification requirements and maintain quality control.
 - B) Perform review of shop drawings, material samples and shop drawings.
 - C) Review Contractors monthly application for payment.
 - D) Review and respond to Contractors Requests For Information.
 - E) Review Contractors Change Proposals and prepare change orders.
 - F) Perform, write and distribute the punch list.
 - G) Schedule and lead the orientation of Owners personnel by the contractors.
 - H) Review all close out drawings and documents submitted by the contractor for compliance with the contract documents.
 - I) Modify the CAD disc to include as-built information furnished by the contractor and submit the as-built disc to the Owner.

PART 6 - CONSULTANTS

To complete the design of many University projects it will require the expertise of specialized consultants. In some cases the consultants will be retained by the University, however, in most instances the consultants will be retained by the Architect. In some cases the consultants retained by the Architect will be a reimbursable expense. The possible consultants and their contractual arrangements are as follows:

- 1) Retained by the Architect as Part of Basic Services
 - A) Structural Engineers
 - B) Mechanical Engineers
 - C) Plumbing Engineers
 - D) Electrical Engineers
 - E) Fire Protection Engineers
 - F) Landscaping Engineers
 - G) Code Compliance Consultants
 - H) Estimating Consultants
 - I) Laboratory design consultants

- 2) Retained by the Architect as a Reimbursable Expense
 - A) Geotechnical Engineers
 - B) Lighting Consultants
 - C) Acoustical Consultants
 - D) Food Service Consultants
 - E) Computer/Communication Consultants

- 3) Retained by the Owner
 - A) Land Surveyor
 - B) Asbestos Abatement Engineer

- 4) Other consultants may be required for specialized projects. The contract and financial obligations of these consultants should be discussed with the Owner prior to executing an agreement.

PART 7 - DESIGN CONSIDERATIONS

- 1) Exterior Design
When the project involves the expansion of an existing building or the addition of a new building, consideration must be given to the exterior appearance of the structure. It is important that the new exterior components of building compliment the architecture of buildings in the proximity of the new building site.

Details from other buildings on campus may be considered for design concepts. In some cases, the Owner may prefer to follow Collegiate Gothic design details in lieu of the adjacent building design concepts. All design concepts should be described to the Owners representative during the schematic design phase to avoid unnecessary redesign efforts. Redesign of components that were not approved by the Owner will be performed at the Architects expense.

Special attention should be given to stone details, specifically in the case of building additions or expansions. Attention should be directed at matching stone profiles of existing copies, stone bands, water tables and window tracery. Other elements deserving special consideration are finials, arched door openings, building connections, bay windows, buttresses and parapet crenellations.

Landscaping, walks and pavement should be sloped to provide drainage away from the building. Locate trench grates, catch basins and area drains to avoid the ponding of water. Drains should be designed to prevent the accumulation of debris and the resulting obstruction of the water flow.

Design and locate dumpster and loading areas such that they are not unsightly. Dumpsters should be placed in an enclosure or another means used to hide them from the view. Curb cuts should be provided to allow cart access to trash dumpsters. Provide adequate drainage to avoid ponding in these areas.

Use all practical means to protect buildings, trees, shrubs and lawns during the course of construction activities. If damage should occur, the damaged materials should be promptly repaired or replaced to meet the University design standards. If University trees and shrubs need to be relocated during the course of the construction activities, schedule this work through the University's representative.

2) Interior Design

Arch styles
Building connections
Courtyards/quadrangles
Building expansions