Architectural Design Process

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8/25/2012

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Overview

Architectural design, like the overall process of development, proceeds through a series of distinct phases. These phases, and the particular architectural services that might be provided in each phase, are defined here.

The definitions are derived from The American Institute of Architects' Document B163 - "Standard Form of Agreement Between Owner and Architect for Designated Services 1993 Edition." The document serves as the basis of legally binding agreements and therefore uses formal language to describe the types of services that an architect might provide at various phases during the development process.

Understanding these services is a good way to understand the types of design-focused activities that might occur during a specific phase of a development project.

Additional information can be found in the AIA Documents Overview or at the web site for the American Institute of Architects: www.aia.org.

Pre-Design Phase:

The stage in which the owner's program, the financial and time requirements, and the scope of a project are established.

Programming - consultation to establish and document the following detailed requirements for a project:

- Design objectives, limitations and criteria
- Development of initial approximate gross facility areas and space requirements
- Space relations
- Number of functional responsibilities personnel
- Flexibility and expandability
- Special equipment and systems
- Site requirements
- Development of a preliminary budget for the work based on programming and scheduling studies
- Operating procedures
- Security criteria
- Communications relationships
- Project Schedule

Space Schematics/Flow Diagrams - diagrammatic studies and pertinent descriptive text for:

- Conversion of programmed requirements to net area requirements
- Internal functions
- Human, vehicular and material flow patterns
- General space allocations
- Analysis of operating functions
- Adjacency
- Special facilities and equipment
- Flexibility and expandability

Existing Facilities Surveys - researching, assembling, reviewing and supplementing information for projects involving alterations and additions to existing facilities or determining new space usage in conjunction with a new building program and including:

- Photography
- Field measurements
- Review of existing design data
- Analysis of existing structural capabilities
- Analysis of existing mechanical capabilities
- Analysis of existing electrical capabilities
- Review of existing drawings for critical inaccuracies, and the development of required measured drawings.

Site Analysis Phase:

The stage in which site-related limitations and requirements for a project are established.

Site Analysis and Selection:

- Identification of potential site(s)
- On-site observations
- Movement systems, traffic and parking studies
- Topography analysis
- Analysis of deed, zoning and other legal restrictions
- Studies of availability of labor force to staff owner's facility
- Studies of availability of construction materials, equipment and labor
- Studies of construction market
- Overall site analysis and evaluation
- Comparative site studies

Site Development Planning - preliminary site analysis, and preparation and comparative evaluation of conceptual site development designs, based on:

- Land utilization
- Structures placement
- Facilities development
- Development phasing
- Movement systems, circulation and parking
- Utilities systems
- Surface and subsurface conditions
- Ecological requirements
- Deeds, zoning and other legal restrictions
- Landscape concepts and forms

Detailed Site Utilization - detailed site analyses, based on the approved conceptual site development design, including:

- Land utilization
- Structures placement
- Facilities development
- Development phasing
- Movement systems, circulation and parking
- Utilities systems
- Surface and subsurface conditions
- Review of soils report
- Vegetation
- Slope analysis
- Ecological studies
- Deeds, zoning and other restrictions
- Landscape forms and materials

On-Site Utility Studies - establishing requirements and preparing initial designs for on-site:

- Electrical service and distribution
- Gas service and distribution
- Water supply and distribution
- Site drainage
- Sanitary sewer collection and disposal

- Process waste water treatment
- Storm water collection and disposal
- Central-plant mechanical systems
- Fire systems
- Emergency systems
- Security
- Pollution control
- Site Illumination
- Communications systems

Zoning Processing Assistance:

- Assistance in preparing applications
- Development of supporting data
- Preparation of presentation materials
- Attendance at public meetings and hearings.

Schematic Design Phase:

The stage in which the general scope, conceptual design, and the scale and relationship of components of a project are established.

Architectural Design/Documentation - responding to program requirements and preparing:

- Review of Owner's Program and Budget
- Conceptual site and building plans
- Preliminary sections and elevations
- Preliminary selection of building systems and materials
- Development of approximate dimensions, areas and volumes
- Perspective sketch(s)
- Study model(s)

Landscape Design/Documentation:

- Consideration of alternate materials, systems and equipment and development of conceptual design solutions for land forms, lawns and plantings based on program requirements, physical site characteristics, design objectives, and environmental determinants.

Structural Design/Documentation - recommendations regarding basic structural materials and systems, analyses, and development of conceptual design solutions for:

- A predetermined structural system
- Alternate structural systems

Mechanical Design/Documentation - consideration of alternate materials, systems and equipment, and development of conceptual design solutions for:

- Energy source(s)
- Energy conservation
- Heating and ventilation
- Air conditioning
- Plumbing
- Fire protection
- General space requirements

Electrical Design/Documentation - consideration of alternate systems, recommendations regarding basic electrical materials, systems and equipment, analyses, and development of conceptual solutions for:

- Power service and distribution
- Lighting
- Telephones
- Fire detection and alarms
- Security systems
- Electronic communications
- Special electrical systems
- General space requirements

Civil Design/Documentation - consideration of alternate materials and systems and development of conceptual design solutions for:

- On-site utility systems
- Fire protection systems
- Drainage systems
- Paving

Interior Design/Documentation - space allocation and utilization plans based on functional relationships, consideration of alternate materials, systems and equipment and development of conceptual design solutions for architectural, mechanical, electrical and equipment requirements in order to establish:

- Partition locations
- Furniture and equipment layouts
- Types and qualities of finishes and materials for furniture, furnishings and equipment.

Materials Research/Specifications:

- Identification of potential architectural materials, systems and equipment and their criteria
- and quality standards consistent with the conceptual design
- Investigation of availability and suitability of alternative architectural materials, systems and equipment
- Coordination of similar activities of other disciplines.

Design Development Phase:

The stage in which the size and character of a project are further refined and described, including architectural, structural, mechanical and electrical systems, materials, and such other elements as may be appropriate.

Architectural Design/Documentation - continued development and expansion of architectural Schematic Design documents to establish the final scope, relationships, forms, size and appearance of a project through:

- Plans, sections and elevations
- Typical construction details
- Three-dimensional sketch(s)
- Study model(s)
- Final materials selection
- Equipment layouts.

Structural Design/Documentation - continued development of the specific structural system(s) and Schematic Design documents in sufficient detail to establish:

- Basic structural system and dimensions
- Final structural design criteria
- Foundation design criteria
- Preliminary sizing of major structural components
- Critical coordination clearances
- Outline specifications or materials lists.

Mechanical Design/Documentation - continued development and expansion of mechanical Schematic Design documents and development of outline specifications or materials lists to establish:

- Approximate equipment sizes and capacities
- Preliminary equipment layouts
- Required space for equipment
- Required chases and clearances
- Acoustical and vibration control
- Visual impacts
- Energy conservation measures.

Electrical Design/Documentation - continued development and expansion of electrical Schematic Design documents and development of outline specifications or materials lists to establish:

- Criteria for lighting, electrical and communications systems
- Approximate sizes and capacities of major components
- Preliminary equipment layouts
- Required space for equipment
- Required chases and clearances.

Civil Design/Documentation:

- Continued development and expansion of civil Schematic Design documents and development of outline specifications or materials lists to establish the final scope of and preliminary details for on-site and off-site civil engineering work.

Landscape Design/Documentation:

- Continued development and expansion of landscape Schematic Design documents and development of outline specifications or materials lists to establish final scope and preliminary details for landscape work.

Interior Design/Documentation - continued development and expansion of interior Schematic Design documents and development of outline specifications or materials lists to establish final scope and preliminary details relative to:

- Interior construction of a project
- Special interior design features
- Furniture, furnishings and equipment selections
- Materials, finishes and colors.

Materials Research/Specifications:

- Development of architectural outline specifications or itemized lists and brief form identification of significant architectural materials, systems and equipment, including their criteria and quality standards
- Coordination of similar activities of other disciplines
- Production of design manual including design criteria and outline specifications or materials lists.

Contract Documents Phase:

The stage in which the requirements for the work are set forth in detail.

Architectural Design/Documentation:

- Preparation of drawings based on approved Design Development documents setting forth in detail the architectural construction requirements for a project.

Structural Design/Documentation:

- Preparation of final structural engineering calculations, drawings and specifications based on approved Design Development documents, setting forth in detail the structural construction requirements for a project.

Mechanical Design/Documentation:

- Preparation of final mechanical engineering calculations, drawings and specifications based on approved Design Development documents, setting forth in detail the mechanical construction requirements for a project.

Electrical Design/Documentation:

- Preparation of final electrical engineering calculations, drawings and specifications based on approved Design Development documents, setting forth in detail the electrical requirements for a project.

Civil Design/Documentation:

- Preparation of final civil engineering calculations, drawings and specifications based on approved Design Development documents, setting forth in detail the civil construction requirements for a project.

Landscape Design/Documentation:

- Preparation of drawings and specifications based on approved Design Development documents, setting forth in detail the landscape requirements for a project.

Interior Design/Documentation:

- Preparation of drawings, specifications and other documents based on approved Design Development documents, setting forth in detail the requirements for interior construction and for furniture, furnishings and equipment for a project.

Materials Research/Specifications:

- Assistance to the owner in development and preparation of bidding and procurement information which describes the time, place and conditions of bidding, bidding forms, and the form(s) of Agreement between the owner and contractor(s)
- Development and preparation of architectural specifications describing materials, systems and equipment, workmanship, quality and performance criteria required for the construction of a project
- Coordination of the development of specifications by other disciplines
- Compilation of a project manual including conditions of the contract, bidding and procurement information and specifications.

Bidding or Negotiation Phase:

The stage in which bids or negotiated proposals are solicited and obtained and in which contracts are awarded.

Bidding Materials - organizing and handling bidding documents for:

- Coordination
- Reproduction
- Completeness review
- Distribution
- Distribution records
- Retrieval
- Receipt and return of document deposits
- Review, repair, and reassembly of returned materials.

Bidding/Negotiation*:*

- Assistance to owner in establishing list of bidders or proposers
- Prequalification of bidders or proposers
- Participation in pre-bid conferences
- Responses to questions from bidders or proposers and clarifications or interpretations of the bidding documents
- Attendance at bid opening(s)
- Documentation and distribution of bidding results

Analysis of Alternates/Substitutions:

- Consideration, analyses, comparisons, and recommendations relative to alternates or substitutions proposed by bidders or proposers either prior or subsequent to receipt of bids or proposals.

Bid Evaluation:

- Validation of bids or proposals
- Participation in reviews of bids or proposals
- Evaluation of bids or proposals
- Recommendation on award of contract(s)
- Participation in negotiations prior to or following decisions on award of the contract(s)

Contract Award:

- Notification of contract award(s)
- Assistance in preparation of construction contract agreement forms for approval by owner
- Preparation and distribution of sets of contract documents for execution by parties to the contracts
- Receipt, distribution and processing, for owner's approval, of required certificates of insurance, bonds and similar documents
- Preparation and distribution to contractor(s), on behalf of the owner, of notice(s) to proceed with the work.

Contract Administration Phase:

The stage in which the work is performed by one of more contractors.

Submittal Services:

- Processing of submittals, including receipt, review of, and appropriate action on shop drawings, product data, samples and other submittals required by the contract documents
- Distribution of submittals to owner, contractor and/or architect's field representative as required
- Maintenance of master file of submittals
- Related communications

Observation Services:

- Visits to the site at intervals appropriate to the stage of the work or as otherwise agreed by the owner and architect in writing to become generally familiar with the progress and quality of the work completed and to determine in general if the work when completed will be in accordance with the contract documents; preparing related reports and communications.

Testing and Inspection Administration - relating to independent inspection and testing agencies, consisting of:

- Administration and coordination of field testing required by the contract documents
- Recommending scope, standards, procedures and frequency of testing and inspections
- Arranging for testing and inspection on owner's behalf
- Notifying inspection and testing agencies of status of work requiring testing and inspection
- Evaluating compliance by testing and inspection agencies with required scope, standards, procedures and frequency
- Review of reports on inspections and tests and notifications to owner and contractor(s) of observed deficiencies in the work

Supplemental Documentation:

- Preparation, reproduction and distribution of supplemental drawings, specifications and interpretations in response to requests for clarification by contractor(s) or the owner
- Forwarding owner's instructions and providing guidance to the contractor(s) on the owner's behalf relative to changed requirements and schedule revisions.

Quotation Requests/Change Orders:

- Preparation, reproduction and distribution of drawings and specifications to describe work to be added, deleted or modified
- Review of proposals from contractor(s) for reasonableness of quantities and costs of labor and materials
- Review and recommendations relative to changes in time for substantial completion
- Negotiations with contractor(s) on owner's behalf relative to costs of work proposed to be added, deleted or modified
- Assisting in the preparation of appropriate modifications of the contract(s) of construction
- Coordination of communications, approvals, notifications and record-keeping relative to changes in the work.

Contract Cost Accounting:

- Maintenance of records of payments on account of the contract sum and all changes thereto
- Evaluation of applications for payment and certification thereof
- Review and evaluation of expense data submitted by the contractor(s) for work performed under cost-plus-fee arrangements.

Project Closeout - services initiated upon notice from the contractor(s) that the work, or a designated portion thereof which is acceptable to the owner, is sufficiently complete, in accordance with the contract documents, to permit occupancy or utilization for the use for which it is intended, and consisting of:

- A detailed inspection with the owner's representative for conformity of the work to the contract documents to verify the list submitted by the contractor(s) of items to be completed or corrected
- Determination of the amounts to be withheld until final completion
- Securing and receipt of consent of surety or sureties, if any, to reduction in or partial release of retainage of the making of final payment(s)
- Issuance of certificate(s) of substantial completion
- Inspection(s) upon notice by contractor(s) that work is ready for final inspection and acceptance
- Notification to owner and contractor(s) of deficiencies found in follow-up inspection(s), if any
- Final inspection with the owner's representative to verify final completion of the work
- Receipt and transmittal of warranties, affidavits, receipts, releases and waivers of liens of bonds indemnifying the owner against liens
- Securing and receipt of consent of surety or sureties, if any, to the making of final payments
- Issuance of final certificate(s) for payment.

Post-Contract Phase:

The stage in which assistance in an owner's use and occupancy of a project is provided.

Maintenance and Operational Programming:

- Assistance in the establishment by the owner of in-house or contract program(s) of operation and maintenance of the physical plant and equipment
- Arranging for and coordinating instructions on operations and maintenance of equipment in conjunction with manufacturer's representatives
- Assistance in the preparation of operations and maintenance manual(s) for the owner's use.

Start-Up Assistance:

- On-site assistance in the operation of the building systems during initial occupancy
- Assistance in the training of the owner's operation and maintenance personnel in proper operations, schedules and procedures
- Administration and coordination of remedial work by the contractor(s) after final completion.

Record Drawing:

- Making arrangements for obtaining from contractor(s) information in the form of marked-up prints, drawings and other data certified by them on changes made during performance of the work
- Review of general accuracy of information submitted and certified by the contractor(s)
- Preparation of record drawings base on certified information furnished by contractor(s)
- Transmittal of record drawings and general data, appropriately identified, to the owner and others as directed.

Warranty Review:

- Consultation with and recommendation to the owner during the duration of warranties in connection with inadequate performance of materials, systems and equipment under warranty
- Inspection(s) prior to expiration of the warranty period(s) to ascertain adequacy of performance of materials, systems and equipment
- Documenting defects or deficiencies and assisting the owner in preparing instructions to the contractor(s) for correction of noted defects.

Post-Contract Evaluation - project inspection at least one year after completion of the work; review with appropriate supervisory, operating and maintenance personnel, and analysis of operating costs and related data for evaluation of:

- The initial project programming versus actual facility use
- The functional effectiveness of planned spaces and relationships
- The operational effectiveness of systems and materials installed.

The Matrix

Development	Design	20 Steps to Design Quality
Concept Phase		
What goes on in the development process	What goes on in the design process	What to do to ensure a well designed project

• Establish organizational goals for the project.
• Determine type of project, potential location and target occupants.
• Consider sources of financing and how the project might be managed.
• Develop an understanding of community and local government support/opposition, concerns/needs.
• Evaluate site: cost and availability, technical and environmental issues.
• Visit and evaluate similar projects.
• Develop project vision and concept.
• Decide whether to explore the concept further.
  ○ *Outcome: specific use of a designated site for an identified market by a specific development team with a defined financial program.*
	• Pre-Design Phase - Activities May Include:
	  ○ Programming
	  ○ Space Schematics/Flow Diagrams
	• Site Analysis Phase - Activities May Include:
	  ○ Site analysis and selection
		1. Start Project Book
		2. Review the Design Considerations Checklist and continue to refer to it throughout the development process.
		3. Understand where design fits in the development timeline
		4. Obtain professional design assistance at the very beginning
		5. Analyze target occupants and establish resident-related design goals for the project
		6. Analyze neighborhood context and establish community-related design goals for the project
		7. Analyze the site to make sure it can physically accommodate the proposed project and provide easy access to the amenities and services its residents will need.
		8. Begin cost analyses - continue to conduct them early and often

Predevelopment Phase		
What goes on in the development process	What goes on in the design process	What to do to ensure a well designed project

• Apply for predevelopment funds.
• Conduct market study.
• Identify governmental/regulatory requirements.
• Select project team and define scope of work for each member.
• Review development concept with potential occupants, community groups, maintenance personnel, and other stakeholders and modify as appropriate.
• Identify sources of financing.
• Negotiate tentative or conditional financing commitments.
• Test cost assumptions.
• Obtain site control.
• Develop feasibility study.
Outcome: analysis of all assumptions regarding market, site, operation pro forma, development pro forma, financial requirements, financing, team and roles, including suggested modifications for the concept to be feasible.
	• Pre-Design Phase - Activities May Include:
	  ○ Existing Facilities Surveys
	• Site Analysis Phase - Activities May Include:
	  ○ Site Development Planning
	  ○ Detailed Site Utilization Studies
	  ○ On-Site Utility Studies
	  ○ Zoning Processing Assistance
	• Early Schematic Design Phase - Activities May Include
	  ○ Architectural Design
	  ○ Landscape Design
		9. Assemble the right project design team
		10. Develop a minimum of 3 alternative site plan concepts for the project.
		11. Use the Design Considerations Checklist to guide the design process.
		12. Use the Operations & Maintenance Considerations Checklist to reality check the design process.

Development Phase		
What goes on in the development process	What goes on in the design process	What to do to ensure a well designed project

• Ongoing consultation between project team and the community.
• Prepare and submit financing/loan application.
• Secure permanent financing.
• Acquire property.
• Secure construction financing.
• Solicit and review construction bids.
• Obtain planning approvals, environmental approvals, if required.
• Obtain building and other permits as required.
Outcome: all elements of project made definite. Letters of commitment, contracts and loan documents binding all participants to the specific elements of the deal are put in place.
	• Later Schematic Design Phase - Activities May Include:
	  ○ Architectural Design
	  ○ Structural Design
	  ○ Mechanical Design
	  ○ Electrical Design
	  ○ Civil Design
	  ○ Landscape Design
	  ○ Interior Design
	  ○ Materials Research
	• Design Development Phase - Activities May Include
	  ○ Architectural Design
	  ○ Structural Design
	  ○ Mechanical Design
	  ○ Electrical Design
	  ○ Civil Design
	  ○ Landscape Design
	  ○ Interior Design
	  ○ Materials Research
	• Contract Documents Phase - Activities May Include
	  ○ Architectural Design
	  ○ Structural Design
	  ○ Mechanical Design
	  ○ Electrical Design
	  ○ Civil Design
	  ○ Landscape Design
	  ○ Interior Design
	  ○ Materials Research
	• Bidding or Negotiations Phase - Activities May Include
	  ○ Bidding Materials
	  ○ Bidding/Negotiation
	  ○ Analysis of Alternates/Substitutions
	  ○ Bid Evaluation
	  ○ Contract Award
		13. Identify and prioritize the key design components of the project - those that will do the most to meet user needs, respond to the context and enhance the neighborhood.
		14. Stress the project's design quality in all funding applications.
		15. Identify and prioritize the key construction materials and systems for the project - those which are most critical to making the project "built to last."
		16. Identify and prioritize the key finishes and hardware for the project - those which are most critical to making the project "built to last."
		17. Monitor bids and review any material, system, finish or hardware substitutions to ensure that design objectives, especially the "built to last" goal, are not compromised.

Construction Phase		
What goes on in the development process	What goes on in the design process	What to do to ensure a well designed project
• Award construction	• Contract administration	**18.** Monitor construction to

contract(s). • Initiate construction. • Manage change orders. • Negotiate certificate of substantial completion. • Initiate marketing and lease-up, including outreach within the community. • Manage construction close out. • Conduct open house for community participants, press, etc.. *Outcome: completely built, leased/sold building, passing all inspections.*	Phase ○ Submittal services ○ Observation services ○ Project Representation ○ Testing and Inspection Administration ○ Supplemental Documentation ○ Quotation Requests/Change Orders ○ Contract Cost Accounting ○ Project Closeout	ensure that all key design, construction and finish goals are being met.
Operation Phase		
What goes on in the development process	What goes on in the design process	What to do to ensure a well designed project
• Staff up. • Occupy. • Provide services.	• Post Contract Phase - Activities May Include ○ Maintenance and	**19.** Create an operation and maintenance manual for the project.

• Operate. • Continue communication with community. *Outcome: effectively rented/sold project meeting financial and other project goals.*	operational programming ○ Start-up assistance ○ Record drawing ○ Warranty review ○ Post occupancy evaluation	**20.** Complete Project Book

About the Author

Michael McCormick founder of MPCS, Inc and Management Professional with 35 years of experience managing over $4 billion in projects for both the Commercial and Federal Government sectors and is a well-known project management (PM) author, consultant, and authority on the subjects of Construction Management (CM), Facility Management (FM), Business Process Management (BPM), Project Management Office (PMO) and Project Portfolio Management (PPM), Risk Management (RM), Software Development and Technology Integration.

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